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BRANCH OFFICES

GLASGOW: 87, Union Street . . . . . *Central 4646*
NEWCASTLE-ON-TYNE: 21, Mosley Street . *Newcastle-on-Tyne 22239*
MANCHESTER: Century House, St. Peter's Square . . . *Central 3101*
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LEEDS: 70, Albion Street . . . . . *Leeds 27174*
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Paying Their Way

THE annual reports of the British Transport Commission from 1948 to 1951 show that British Railways each year earned substantial net receipts, with an operating ratio never exceeding 96 per cent and dropping to 91 per cent for 1951. This is an achievement unrivalled by any major European system serving a community as highly industrialised and with road transport as developed as Britain. In 1951 moreover British Railways' net receipts of £35 million—or £32 million with the deficit on their ancillary road services—compared with £44 million from the Commission's activities as a whole, seem to have more than covered their fair share of the £46 million central charges, including interest on British Transport Stock. This should dispel the absurd but widely current fallacy that the main-line railways do not pay their way; as to the supposed corollary, that the loss is borne by the taxpayer, the Transport Act of 1947 precludes this, and the relatively small deficits on the net revenue account of the Commission as a whole have been met from the Commission's reserves. British Railways have not been "in the red," so differing from the London Transport, Docks & Inland Waterways, and Hotel Executives. The first of these in 1951 lost on its road services; and the Commission now unfortunately is seeking authority from the Transport Tribunal to raise some British Railways passenger fares to help meet an anticipated deficit on London Transport. The Hotels Executive working deficit in 1951 was incurred in restaurant car operation; were the activities of this Executive to be a purely railway responsibility, much of this loss, if it persisted, would be accepted as a necessary expense of providing passenger amenities. That 1952 will prove to have been as good a year for the Commission as 1951 was forecast last week by Lord Hurcomb, Chairman of the B.T.C.; and that British Railways at present are "running on an even financial keel" was stated categorically only a few days ago by a Government spokesman, Lord Selkirk. Mr. John Elliot, Chairman of the Railway Executive, was right to emphasise this in his speech last week to the stationmasters of Cambridge District, quoted on another page. The railways deserve more publicity for this financial achievement in the face of restricted capital development and other difficulties, not as an argument in favour of nationalisation, but as a testimonial and encouragement to the men who make them a success.

Transport Bill in the Lords

THE widespread feeling that those who manage the areas into which the railways are to be divided under the new Transport Bill, and others, should know the area financial position more accurately, was voiced in an amendment by Lord Falmouth last week during the Committee Stage of the Bill in the House of Lords. His amendment, though withdrawn, was a noteworthy contribution to an otherwise rather pedestrian debate. Lord Falmouth's suggestion that the area receipts and expenditure should be published in not too great detail, with some operating statistics, is reasonable. The Government objections stated by Lord Swinton, who made much of the accountancy difficulties and of the cost of an organisation analagous to but less productive of information than the Railway Clearing House, were not convincing. It is satisfactory that the matter is to be looked into, to see how far the figures can be broken down by areas. There is, however, a vagueness about this as about other proposals as to railway reorganisation. The Government seems determined that the former railway-owned docks shall not be returned to railway control, but there is still hope for the long overdue abolition of the Hotels Executive, with a return of its responsibilites to the railways.

Loan for Rhodesia Railways

THE International Bank for Reconstruction & Development has announced a loan of $14 million (about £5 million) to Northern Rhodesia to assist the three-year development programme of Rhodesia Railways. It will be used to pay for imports of equipment and materials, mostly from Britain, and to help in building the south-east connection, the line giving Rhodesia a new outlet to the sea at Lourenço Marques, on which construction has already begun. The loan is for a term of nineteen years, carries an interest and commission rate totalling 5¾ per cent, and is fully guaranteed by the British Government. The purchases will be made in sterling obtained from Britain with dollars provided by the Bank through the loan. The total cost of the Rhodesian railway development programme, of whose scope an indication was given editorially in our January 23 issue, is put at about £28 million ($79 million). A loan of $14 million was made in 1951 from the U.S. Economic Co-operation Administration, now the Mutual Security Agency. Most of it was spent on locomotives and rolling stock, some of which had been already ordered from United Kingdom manufacturers. The remainder of the sum needed to complete the programme has been or will be raised in Rhodesia or Britain.

Overseas Railway Traffics

THE aggregate of Peruvian Corporation receipts for the six months to December, 1952, at 55·5 million soles from the Peruvian and 103·8 million bolivianos from its Bolivian undertakings compares with 49·3 million and 95·1 million respectively for the second half of 1951. The increase over the preceding year was maintained during January; for February, receipts from Peru were 8·2 million soles against 7·9 million for the corresponding month of

1952, but those from Bolivia were 13·4 milions against 15·2 million bolivianos. The Peruvian remittance rate in all cases was 42/43 soles to the £ and the Bolivian 169·61 for restricted amounts. There is no explanation yet for increases in 1952 and 1951. In February, heavy rain and landslides interrupted traffic on the Central and Pacasmayo Railways, both in Peru, which may help to explain why February receipts were less than those for January (9·3 million soles).

The Kangra Valley Railway

WE are glad to note that the Kangra Valley 2 ft. 6 in. Branch of the Indian Northern Railway has been reopened from Nagrota to Jogindernagar. Built originally about 1927-28 to carry heavy plant for a hydro-electric installation near Jogindernagar, this branch of the former North Western system also serves a small hill station, Palampur, and from its railhead runs a motor road further into the hills to the Kulu Valley, famed for its apples and other English fruits. The construction involved very heavy bridging and earthworks. The larger bridges are: the Chakki, six spans of 130 ft., two of 80 ft., and 17 of 40 ft.; the Gaj, ten spans of 100 ft.; the Banganga, one span of 250 ft. and four of 60 ft.; and the Reond, one span of 180 ft. and two of 40 ft. This 180-ft. span is the only steel arch in India, and bridges a chasm 200 ft. deep with nearly vertical sides. The three-pin spandrel-braced arch has a rise of 31 ft. and was fabricated in India; its erection required the greatest precision and the closure on the central pins was only $\frac{1}{16}$ in. out of truth. The construction also involved heavy and deep rock cutting.

Reasons for Building Many Indian Railways

IN reviewing events in the 100 years of Indian railway history, there are one or two points not mentioned elsewhere that may be noted. The area covered by British India was about 1,805,000 sq. miles, or 20 times that of Great Britain and nearly half that of Europe. It was inhabited by about one-sixth of the world's population, speaking 100 languages, and was in truth a sub-continent under one Government. With its 40,000-mile railway system, it had only 1·28 miles per 10,000 population, though its 2·22 miles per 100 sq. miles of territory was better than in most others at the same stage of development. It should be remembered, however, that substantial funds were devoted to the considerable mileage of lines that had to be built and maintained for strategic reasons. Justification for building many other railways was often not possible on immediately foreseeable financial grounds, but construction was sanctioned to assist in opening up the country and for other developmental reasons, a policy that usually but not invariably proved sound in the long run. Such occurrences as famines also frequently led to railway construction in unexpected directions and sometimes prematurely.

State Railway Administration in British India

THE Indian Railways' "close association with the State has not impaired the observance of commercial principles of working, which are so necessary to maintain efficiency, while the public utility aspect of their functions has been steadily kept to the fore." This quotation is from the conclusion of Mr. Badhwar's comprehensive article in this issue, and we agree with it. Moreover, unlike those in most other countries, the State-worked lines in British India also earned this reputation. Their efficiency, based on commercial principles, was in no way inferior to that of neighbouring company-worked systems, and in some respects their prowess outshone their neighbours'. A word of praise is also due to the Railway Board and its relations with the administrations of the various railways. These relations were not perfect, but on the whole they worked well and, from all accounts, were superior to those of supreme administrations exercising a more centralised control in some countries. In fact, they might even be considered for adoption, with suitable adaptation to local conditions, if changes are contemplated elsewhere.

Safety on Indian Railways

IN surveying the hundred years of railway development in the Indian sub-continent one can hardly fail to remark upon the high standard of safety with which its great network of lines has been worked. Apart from the considerable percentage of those caused by deliberate sabotage during the past two or three decades, the number of serious accidents has been remarkably small. It is especially so when the calibre of the junior staff is considered, the pointsmen, the permanent-way gangmen, engine crews, guards, repair artisans and even cabinmen and station staffs. Their reliability is evidence of the steadiness of the average Asiatic, provided that he is given a definite routine job and is not expected to think far beyond its daily requirements. On these men depend the safety of mail, express and all other trains, and credit is due to all concerned—British, Indian, Pakistani, Burman and all the sub-nationals of these races —alike. The higher-grade staffs share this credit for their patience and tact in training the men under them.

Southern Change-of-Frequency Scheme

IN spite of several outstanding features, it is doubtful whether eventual completion of the Southern Region change-of-frequency scheme in the London electrified area will attract a degree of public interest commensurate with its magnitude. During the discussion on March 4 of papers on this subject read to the Southern Region Lecture & Debating Society by Mr. A. Watt, Electrical New Works and Development Section, Railway Executive, and Mr. R. E. Coward, Assistant Engineer, Electrification, Southern Region, it was shown that the most noticeable effects from the traveller's viewpoint were likely to be livelier acceleration of trains, and more constant lighting in the coaches. At present there are some journeys on which the progressive decrease of illumination demonstrates the phenomenon of voltage drop in an inconvenient manner. The operating and electrical staff will be more aware of the advantages of the scheme than the traveller, particularly in weather crises such as floods or frost and snow. Connection with the national 50-cycle grid will facilitate maintenance of supplies in emergency conditions—in the recent flooding, Deptford at first had only one frequency-converter available for the 25-cycle railway supply, the turbine room being inundated —while the new supervisory control system will speed up the group operation of circuit-breakers. It was mentioned at the meeting that in one heavy frost there had been 700 trippings to deal with in 24 hr.

Conversion Under Traffic

ONE record claimed for the Southern Region electrical works mentioned in the previous note is that the ring main system between substations involves the largest single installation yet made of oil-filled cable. Another point brought out in the paper on the civil engineering aspect was that substation buildings are being adapted and new ones put up without interruption to a dense suburban and main-line electric service. These conditions involve problems not met with in the conversion of a steam-worked line, where traffic is less intensive and substations are not brought into service until the final stage. Production of cable troughing has devolved on the Region's concrete depot at Exmouth Junction, where a section has been devoted to this work. The scheme presumably will be initiated at 660 V., but provision has been made for a changeover to 750 V. to be effected in a matter of hours when required. This is in conformity with the recommendation in the B.T.C. report on "Electrification of Railways" regarding a standard voltage for live rail systems, but the date when it is done will depend on the rate of obsolescence of existing traction equipments not insulated for the higher voltage.

Improved Summer Passenger Services

DESPITE the real progress represented by British Railways passenger timetables this summer, present circumstances are bound to make them an ingenious compromise that makes fullest use of limited resources. Some details are given on another page. Track improvements,

though much remains to be done, have allowed of accelerations such as those of the Anglo-Scottish day services. Introduction of new standard locomotives has facilitated further improvements in East Anglia complementary to those already effected by the Eastern Region; not the least benefits from these are the economies from quicker turnround of engines, coaching stock, and crews. Smart timings moreover put staffs on their mettle. Against this, the Railway Executive has rightly determined to increase the overall average speed of trains and not the speed of a spectacular few. The high-speed streamliner of the 1930s, with its disturbing effects on operating, is unlikely to return; apart from the limitation of the weight of trains, high speed is not the attraction it was before development of air services. The rationing of passenger train mileage through restricted coal supplies to four-fifths of the pre-war figure means fewer non-stop runs, so as to serve intermediate points. Every effort, however, is being made to improve punctuality and the cleanliness of stock; refreshment car facilities are being increased; and the duration of the augmented services is longer that it was last year. Developments such as the reversion to the former Euston to Birmingham two-hour and Charing Cross to Folkestone 80-minute timings are encouraging, and appear to be desirable from every point of view.

Good Value for Continental Visitors

BRITISH RAILWAYS nine-day all-line "guest" tickets and 500-mile travel unit scheme for Continental visitors, described in our March 6 issue, give good value for money. Thus the former give something like £8 worth of unlimited third class travel in nine days—enough for a trip to Edinburgh and back, and some shorter trips. Neither scheme is new in conception, but in these days of currency restrictions one of their main advantages is the facility of booking in the country of origin. Both, however, should result in increased travel in the provinces by visitors from Continental Europe. The paramount tourist attractions of London, from which surrounding places such as Windsor can be easily reached by road, and the mostly undeserved reputation of provincial hotels have tended to check the development in Britain of these types of facility for the tourist from abroad, at least to the same extent as in other countries. In Switzerland and Italy they have been developed to a remarkable extent, but neither there nor elsewhere is there a tourist centre so preponderant as London and so placed in relation to the point of entry or exit. For many years British railways have taken steps to promote and to avail themselves of the benefits derived from tourism in this country; but only since the last war has the necessity for a national effort to attract and cater for tourists made itself acutely felt.

Cook's Continental Time-Table

THE current issue of *Cook's Continental Time-Table* marks its eightieth birthday and seventy-fifth year of publication. In March, 1873, Thos. Cook & Son, "with a view of supplying a long-felt and oft-expressed want of the Travelling Public," first published their 140-page *Cheap, Concise and Simple Guide to All the Principal Lines of Railway, Steamers and Diligences on the Continent of Europe*; and since then there has been regular monthly publication except for a break during the last war. There are older timetables than Cook's: *Bradshaw* dates from 1841, whilst the French *Chaix* is in its 107th and the U.S.A. *Official Guide of the Railways* in its 85th year. None, however, is more comprehensive in scope or more accurate in detail. In 1873, the only obstacle to travel in most European countries was the still undeveloped state of railway and steamer communications. Today, despite the development of all forms of transport, with a revolutionary increase in the speed and comfort of railway journeys, the main impediment is currency and passport regulations; the latter fill eleven of the 428 pages of Thos. Cook & Son's indispensable publication.

British Indian Railway Achievements

ON April 16, 1853, the first section of railway in India was opened for traffic and its centenary is now being celebrated. Though this 20-mile line was in what is now the Republic of India, it was the forerunner not only of the present-day Indian railways, but of the whole system throughout the sub-continent, including Pakistan and Burma, as well as the Indian Republic. Until comparatively recently this sub-continental system was under a unified control, the Government of British India, and its route-mileage exceeded 43,000 miles.

The general history and development of this system and that of the portion of it in the Republic of India since 1947, is the subject of an article in this issue contributed by Mr. F. C. Badhwar, Chairman of the Indian Railway Board. At the same time, the occasion demands some recognition of the part played by Great Britain and the European and Indian staffs of the railways of the sub-continent in their construction, technical development, and operation. In fact, the vast number of outstanding achievements standing to the credit of these staffs cannot be overlooked. And here we would point out that the Indianisation of the higher grades had been proceeding apace for many years prior to independence and partition in 1947. Actually in 1946 the officer grades of the Class 1 railways contained no fewer than 70·6 per cent Indian nationals and only 29·4 per cent Europeans. On the smaller railways and in all subordinate and menial staffs the percentage of Europeans was negligible. Provided they had the suitable qualifications and had shown themselves capable of shouldering responsibility, Indians attained the highest posts.

The mechanical achievements during the 100 years railways have been serving India are largely covered by another article in this issue dealing with the construction in the United Kingdom of locomotives for India. For, though carriage and wagon bodies have always been built in India, almost all locomotives—and until recently underframes, wheels and axles for rolling stock—have been imported from Great Britain.

On the other hand, civil engineering achievements have been the responsibility of the railway staffs, the construction works generally being carried out under them by Indian or domiciled firms of contractors. The construction and maintenance of over 43,000 route-miles of railway are no mean feats, but when the difficulties of much of the Peninsula and Burma are considered, the achievement is colossal. We refer particularly to the problem of bridging the multitude of great rivers and of surveying, building and maintaining the various mountain lines. As these two features are probably the most notable, the notes below are confined to giving some idea and examples of outstanding Indian bridges—two are just under two miles, about 15 are from ¾-mile to two miles and a great many more are over ½-mile in length—and of the principal mountain railways.

With the exception of the United States, no country possesses a greater wealth of really large bridges. Moreover, many of the Indian rivers oscillate or meander over wide areas, necessitating the expenditure of large sums on training works to ensure that they shall continue to pass under the bridges when built and not by-pass them. This is the case at the great mile-long Hardinge Bridge over the Lower Ganges, for instance, where the initial cost of the training works was about £700,000, and considerably more has had to be spent on them since the bridge was completed in 1915. It consists of 15 350-ft. spans carrying double-line 5 ft. 6 in. gauge tracks; the wells supporting the piers were sunk to a maximum depth of 150 ft., and the total cost was nearly £3,000,000.

There are four other large bridges over the Ganges, one of them being 1·2 miles in length and consisting of 40 spans of 150 ft. The mighty Indus is also bridged at five points. The bridge at Kalabagh is the longest, nine spans of 250 ft. and four of 175 ft., over half a mile long, but the Lansdowne Bridge at Sukkur was a pioneer in large cantilever structures, and was completed in 1889, the year before the Forth Bridge; its main span has a clear length of nearly 800 ft. The Indus bridges at Attock and

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Khushalgarh are also noteworthy structures. Three of the five great Punjab rivers each have three important railway bridges over them. One of those over the Jhelum consists of 50 spans each 90 ft. in length. The Alexandra is the best known of the Chenab bridges, and has 17 spans of 133 ft. As constructed, the bridge over the Sutlej at Adamwahan had 16 spans of 250 ft. and cost over £500,000. One of the other bridges over this river was originally a mile long, but now consists of 11 spans of 200 ft., with separate up and down superstructures on the same piers. The fourth Punjab river, the Beas, is also bridged with separate up and down 200-ft. spans on common piers.

There are four large bridges over the Jumna, those at Delhi and Allahabad consisting respectively of 12 and 14 spans of 200 ft. In Bihar the Gogra is crossed by three big bridges of from 3,695 ft. to 3,911 ft. in length (17 and 18 spans of 200 ft.), and there are also large bridges over both the Kosi and Gandak.

The longest bridge in India is over the Upper Sone. It is 10,052 ft.—nearly two miles—long and has 93 100-ft. spans. A second bridge over that river consists of 28 spans of 150 ft. and is about ⅞-mile in length. The Hooghly is bridged at Naihati and at Bally—the Willingdon Bridge, illustrated on page 342. In western India the Nerbudda bridge as built had 25 spans of 183 ft., and the Bassein bridges have 69 and 25 spans respectively, each 62 ft. 6 in. long.

Along the south-east coast are more great bridges over the Roopnarain, Mahanadi, Godavari, Kistna and Cauvery-Coleroon rivers. In fact, the Godavari bridge is the second longest, 9,096 ft., nearly 1¾ miles, comprising 56 spans of 160 ft. and one of 40 ft. Burma also has many large bridges, notably that over the Irrawaddy and the famous Gokteik viaduct. The Irrawaddy bridge near Mandalay, roughly ¾-mile long, consists of nine 350-ft., one 250-ft., and six 60-ft. spans and contains 11,000 tons of steelwork. The Gokteik viaduct spans a gorge about 2,000 ft. wide, and its rail level is over 800 ft. above the river below. The great central steel trestle, 350 ft. high, stands on the mouth of a natural rock tunnel through which the river flows, but one appears to be able to toss a stone from a train into the river nearly vertically below.

These were by no means all the big bridges on the British Indian railways system, but they give some idea of the magnitude of the construction works severally and in aggregate that were involved. There were also other smaller but spectacular bridges, such as the two, each 200-ft. high, (1) the Louise Margaret Bridge over the Chappar Rift in Baluchistan, and (2) the Reond steel arch on the Kangra Valley line; there are also several Scherzer rolling lift bridges in Burma. The Reond arch is briefly described in an editorial note in this issue.

Among the various remarkable mountain railways in pre-1947 India, the oldest and most important from the traffic point of view are the Bhore and Thull ghat sections on the main lines from Bombay (*a*) to Poona and Madras and (*b*) to Calcutta and Delhi, respectively. The line up the Thull Ghat, as completed in 1865, was 9½ miles long and had double tracks, one reversing station, 13 tunnels 1½ miles in aggregate length, and six viaducts of from 80 to 180 ft. in height. The Bhore Ghat incline was 6½ miles longer, and climbs through 1,800 ft. with the same ruling gradient, 1 in 37. It originally had 2¼ miles of tunnelling and eight high viaducts, and its construction took 7½ years. Both these ghat sections have been electrified for many years, and have been considerably realigned and modified by reversing station elimination and tunnel daylighting. The most recent works to this end were described and illustrated in our issue of June 9, 1950. They both hug precipitous hillsides and form links in through trunk routes among the most important in the country.

The next most important 5-ft. 6-in. gauge mountain line traverses the Bolan Pass to reach Quetta. It is the section of 86 miles between Sibi and Kholpur and rises through 5,400 ft. The 24 miles below Kholpur are double line and have ruling gradients of 1 in 25 and 1 in 33. There are 11 tunnels, one a very long one, and 12 large bridges. There was a second and older route to Quetta, the Sind-Pishin, but many of its 120 miles of line have now been closed and dismantled. It crossed the notorious Chappar Rift on the 225-ft.-high Louise Margaret Bridge and had many tunnels. Another feature was the length through Mud Gorge, where the whole hillsides were constantly on the move. The ruling gradient was 1 in 45.

The most recently-constructed broad-gauge mountain line, is the well-known 26-mile Khyber Railway, completed in 1925. It climbs from Jamrud, near Peshawar altitude 1,496 ft., to 3,405 ft. at Landi Kotal in the Khyber Pass, and then descends to 2,622 ft. near the Afghan frontier. The ruling gradients on the rise are 1 in 33 and 1 in 40 and on the descent 1 in 25. There are 2·55 miles of tunnelling and two high viaducts, but the main feature is the development of length in a remarkably compact area, by means of two reversing stations. Here two points 4½ miles apart by railway are only ¾ mile, the one from the other, as the crow flies, and there is a difference in altitude between them of 340 ft.

There are four outstanding metre-gauge mountain lines, one in Southern India, one in Assam, and two in Burma. The first, in the Nilgiri hills, climbs from the plains to an altitude of 7,300 ft. at Ootacamund in a distance of 29 miles. A considerable percentage of this length of line is equipped with the Abt-type track and has a ruling gradient of 1 in 12. The line in Assam is what was known as the Assam-Bengal Hill Section. It has a normal ruling gradient of 1 in 60, but there is a 9½-mile banking section inclined at 1 in 37.

The older of the two hill lines in Burma is the Mandalay-Lashio branch, opened in 1903 and about 180 miles in length. When the Japanese invaded Burma in the last war it was being extended to the Chinese frontier at Kunlong, to link up with the Chinese section of the Sino-Burma railway, also then under construction. The construction engineers working on the 100-mile British extension managed to escape to India only with great difficulty and hardship, as was also the case of the whole European staff of the Burma Railways. The overall ruling gradient of the Lashio branch is 1 in 40, but in the 12½-mile initial rise from the plains there is a continuous 1 in 25 gradient broken only by four reversing stations. The location of the line near the two upper reversing stations is very similar to that subsequently adopted on the Khyber, and the line up to this point is particularly spectacular. One of the main features of this branch is the Gokteik viaduct already mentioned.

The other hill-section in Burma is the Southern Shan States branch. The first 87 miles of it were opened in 1916 and a further 11 miles were added later. It is not quite so spectacular as its northern neighbour, but the climb is longer and reaches a greater altitude of 4,600 ft. near Kalaw. There are nearly 16 miles of 1 in 25, virtually continuous, and leading up to the summit; there is a complete spiral loop and again four reversing stations.

The best-known 2 ft. 6 in. gauge mountain line is the Kalka-Simla Railway. It climbs from 1,800 ft. at Kalka, the broad-gauge railhead, to 6,800 ft. at Simla in a distance of 60 miles. There are 102 tunnels, one of them 3,750 ft. in length, and a feature of this line is a number of "galleried" viaducts, consisting of several tiers of arches superimposed, each one over those below. The ruling gradient is 1 in 33. As Simla was the summer capital of the Governments of India and of the Punjab, and Army Headquarters also, the railway had to carry a heavy traffic despite its narrow gauge and steep gradients. For several decades many first-class passengers have been accommodated in comparatively fast rail motors. Another interesting line of this gauge is the Kangra Valley Railway, built as a branch of the North Western System and referred to in an editorial note in this issue.

The only 2-ft. gauge mountain line is the 51-mile Darjeeling-Himalayan, which climbs from the plains at Siliguri to 7,400 ft. at Ghoom before a short descent to Darjeeling. The ruling gradient is about 1 in 23 and some of the curves have a radius of only 55 ft. and form fantastic loops. There are reversing stations, and the line runs for considerable distances on, alongside, or just above or below the motor

road, and there are many level crossings. There is quite a fleet of small saddle-tank locomotives, and a coolie was employed to sit on the buffer-beam of each with a box of sand and pour it on to the rails to prevent slipping. Each locomotive also carried a long wooden lever to assist in rerailing when necessary, as may be seen in one of the illustrations in this issue. Each coach or wagon is hand-braked, a brakesman standing on a long transverse lever across the end of the vehicle to apply the brakes.

It is possible here to mention only a few features of Indian railway operation. Some idea of the Peninsula-wide working of through passenger services before Partition is given by the following table:—

DAILY OR MORE FREQUENT LONG-DISTANCE THROUGH PASSENGER SERVICES IN BRITISH INDIA

Bombay-Calcutta *via* Jubbulpur	1,349 miles
Bombay-Calcutta *via* Nagpur	1,223 ,,
Bombay-Madras	794 ,,
Bombay-Peshawar *via* Delhi and Lahore	1,463 ,,
Mangalore-Peshawar *via* Delhi and Lahore ...	2,476 ,,
Calcutta-Peshawar *via* Delhi	1,500 ,,
Calcutta-Madras	1,032 ,,
Karachi-Lahore	765 ,,
Madras-Dhanushkodi (for Ceylon ferry)	459 ,,
Rangoon-Maymyo *via* Mandalay	427 ,,

For several decades goods trains have been fitted and worked with full vacuum braking on broad-gauge and most metre-gauge lines, and on all hill railways except the Darjeeling Himalayan. The goods stock is also close-coupled, being fitted with screw link couplings on the 5-ft. 6-in. gauge and screw central couplings on the metre-gauge systems. Steel-bodied wagons have been standardised since very early days.

Passenger trains of both gauges have had electric side and tail brake-van lights for 40 or more years, and electric searchlights, headlights and cab-lights have been fitted to locomotives for many years; lights are also often provided over the motion. Locomotive running repair facilities have generally not been behind those in this and many other countries, and a number of locomotives have been built in India, a few broad-gauge at Jamalpur (E.I.R.) and more of narrower gauges at Ajmer shops (B.B.C.I.R.). Colour-light signalling is installed at some of the larger cities and junctions and traffic control is established in many areas. Mile-a-minute daily schedules have been introduced between passing points over considerable distances but some were subsequently withdrawn. These are a few points which may not be generally known, but throw some sidelight on conditions in India throughout much of the past century.

Proposals and Prospects for British Transport

ENOUGH time has elapsed since the Transport Act of 1947 for its operation to be viewed with the type of criticism that is analytical without necessarily being condemnatory. Mr. A. J. Pearson, Chief Officer (Administration), the Railway Executive, approached transport nationalisation from this viewpoint in a paper on "Developments and Prospects in British Transport with Special Reference to Railways" presented to the Institute of Transport on March 16. His is a serious study which keeps well in mind the long-term view. Describing nationalisation as a political act, he said that did not necessarily make it wrong, but his paper showed the risk there is in the politician's need for sweeping and impressive results, of pressing matters ahead too fast and without due preparation. Nationalisation had let in new problems, but he did not think them incapable of solution although this appeared to be the view of the present Government. In his own opinion the main addition to the general welfare to be found in nationalisation should be a single financial ownership making possible the continued development of all forms of transport for the public benefit. The present Bill might have its advantages as a delaying action, giving time for careful thought and steady development.

Indicating what he considered to have been mistakes in the 1947 Bill, Mr. Pearson again referred to lack of a detailed plan of development which should have been understood by all and, particularly by the public. Unfortunately for this view the public is increasingly sceptical over plans of development. It would rather recognise benefits for itself if and when they occur. So far it has not been given much practice in this direction by the nationalised industries, and publicised plans of development have had a habit either of collapsing ignominiously or being accompanied, at least in their early stages, by lessened facilities and higher prices. Mr. Pearson also criticised the separation of catering and docks from the Railway Executive, and the fact that an organisation was laid down in the 1947 Act instead of being allowed to evolve after careful study of the facts by those in charge of the industry.

The railways missed their former directors, who had been able to speak for them in both houses of Parliament. Under nationalisation the trade unions had appealed to the last Government over the heads of those running the industry, and the result had been a weakening of discipline and impaired public service. These difficulties had not occurred before the war, when the State already exercised effective control over transport but the industry was not subject to political interference. If the Government was not satisfied with the way the industry was being run, the remedy should be to change those in control, not to say what changes should be made in the organisation, which neither it nor the public could possibly know. Mr. Pearson suggested that what was required was an independent organisation with Government representatives appointed to watch it in the public interest. Before the war the railway chairmen's speeches had explained their method of working and had been constantly under discussion, but were not made the subjects of political controversy, neither did anyone outside think of making changes or suggest what the changes should be.

Looking ahead, Mr. Pearson thought that the present Transport Bill would be only an interlude in the general trend of development since the first world war. He considered that when the industry settled down the transport interests themselves would seek the harmony of operation that had been urged by Lord Hurcomb in 1935 and 1945, and by Sir Eric Geddes in 1920. In the next ten years the railways might evolve a basis for an integrated public transport service of all types, competing as it did today with private transport. On a shorter view, if the part of the nationalised service that remained after the new Bill were organised so as to build up a co-ordinated transport unit comparable to one of the railway groups before nationalisation, but using experience gained since 1948, there should be an immediate improvement from the point of view of the user.

The restoration under the new Transport Bill of rail and road competition would be a cold douche with probably beneficial effects in the long run. Because railway work was specialised it did not mean that it should not be thrown open much more than it was to business methods and ideas in other industries. There must be no vested interest in railway obsolescence. If there were too many railway historians and too few thinking of railway progress, the industry might live too much in the past. The railway ought not to be thought of as a contracting form of transport, and it should be given equal priority in capital investment with other forms of transport in the national interest. It had been estimated that there was an immediate profitable field for a capital investment of at least £500 million on the railways of this country, in addition to the annual renewal expenditure, over the next 10 years or so, and it would enormously strengthen the nation's productive assets to do this.

How far hopes of capital investment will be realised may well be influenced by the spirit in which the railways seize the opportunities for commercial development accruing from the freedom on charges provided in the new Transport Bill. If a spirit of enterprise permeates the staff as a whole, some of the prejudice against railways, and the disbelief of their attempts at self-justification, that were fruits of the political aspect of nationalisation, may be dissipated, and a service created in which the public, trade, and industry will have cause for satisfaction.

New South Wales Government Railways

THE report of the Commissioner for Railways, Mr. R. Winsor, for the year ended June 30, 1952, shows that earnings amounted to the record figure of £68,909,720, an increase of £19,461,982 on the total for the previous year. Concessions allowed by the Department of Railways totalled £561,011, including £189,999 in reduced charges for the transport of livestock and fodder, and £361,427 in freight rebates on consignments of flour, rice, canned fruits, and other goods. Working expenses at £64,020,193 show an increase of £14,852,715 on the previous year. The higher expenditure was traceable to increases in basic wages, variations in awards, large overtime payments arising from staff shortages, increases in prices of coal and other supplies, heavy consumption of fuel oil by locomotives and power stations, and use of inferior coal. The profit on operations of £4,889,527 and £800,000 contribution from the Government towards losses on working of country developmental lines were together insufficient by £2,452,087 to meet interest on loan capital and the other statutory charges against the Department.

Some of the principal figures for the year compared with those for the previous year appear below:—

	1950-51	1951-52
Total miles open for traffic	6,113	6,113
Earnings	£49,447,738	£68,909,720
Working expenses	£49,167,478	£64,020,193
Balance	£280,260	£4,889,527
Percentage of profit to capital invested	3s.	£2 7s. 5d.
Percentage of working expenses to earnings	99·43	92·9
Earnings per average mile open ...	£8,089	£11,273
Working expenses per average mile open	£8,043	£10,473
Return per average mile open ...	£46	£800
Passenger journeys	268,567,083	268,167,596
Goods tonnage	17,131,304	18,527,732

New motive power placed in service included three "D58" class 4-8-2 goods locomotives; and twenty Alco 1,600-h.p. diesel-electric locomotives built at the Alco works at Montreal, the electrical equipment being made by the Canadian General Electric Company at Peterborough. The first two of fifty Beyer-Garratt locomotives ordered from Beyer, Peacock & Co. Ltd., Manchester, arrived in Sydney in mid-June, 1952; they were conveyed to Eveleigh Works for assembly but were not available for service at the end of the year under review. New rolling stock included 1,633 goods vehicles of various types. Two eight-car air-conditioned passenger train sets began operating as "Central West Expresses" between Sydney, Parkes, and Dubbo; and in November, 1951, the "North Coast Daylight Express," a four-car air-conditioned diesel train, was placed in service between Sydney and Grafton; this new type of train, the first of seven being built by the Department at Chullora, consists of two power and two trailer cars.

The first electric locomotive, developed as a prototype for main-line electrification, made its first trial trip from Chullora to Liverpool in June last. It is a general purpose Co+Co locomotive with sufficient power to haul the same goods loads as "D57" and "D58" class steam locomotives but at higher speed, and to haul passenger trains at the speeds run by "C38" class engines. Construction was in the Departmental Workshops with the help of contractors for the electrical equipment and some mechanical parts. Total weight is 112 tons, length over buffers 55 ft., and wheel diameter 4 ft. Each axle has geared to it a motor of 450 h.p. at one-hour rating. Control gear is electro-pneumatic, and regenerative braking is fitted, and automatic and independent A7-EL Westinghouse air brakes. The 40 electric locomotives on order in Britain for the electrification of the Western Line to Wallerawang are stated in the report to be of generally similar design to the prototype, but equipped with more powerful motors giving 3,780 h.p. at one-hour rating.

Civil engineering works in hand at the end of the year included quadrupling of the lines between Lidcombe and Penrith and between Strathfield and Hornsby, the construction of the St. James to Wynyard *via* Circular Quay section of the City Railway, excavations for the Eastern Suburbs line, and electrification of the main Western Line between Sydney and Wallerawang.

The value of stores purchased amounted to £35,090,471; this figure exceeded the record amount for the previous year by £12,101,453. At June 30, 1952, the capital expenditure on lines open for traffic was £217,621,764, an increase of £21,769,418 on the amount at the end of the preceding year.

Locomotive Maintenance on British Railways

THE most important part of a railway mechanical engineer's activities is the efficient maintenance of locomotives. In view of the annual expenditure incurred and the potential savings in money and materials which can be made, it is essential that the department controlling locomotive maintenance and repair should be a highly efficient organisation. Mr. R. C. Bond, Chief Officer (Locomotive Construction & Maintenance), Railway Executive, British Railways, in his paper "Organisation and Control of Locomotive Repairs on British Railways" to the Institution of Locomotive Engineers on March 18, said that close collaboration should exist at all levels between those who design, build and maintain locomotives and those who use them. The dual nature of motive power work must be recognised, and its control must be such as to maintain an even balance between the demands of the Operating Department and the requirements of the mechanical engineer.

It is the responsibility of the running sheds to maintain locomotives in a high state of mechanical efficiency for as long as possible between successive repairs in the main workshops, by a carefully organised system of periodical and mileage examinations. Repairs undertaken in running sheds should properly be confined to those necessary to make good minor defects which arise in daily service and those which can be effected by replacement or attention to the smaller or more readily renewable parts. A decision on when it is no longer economical to retain a locomotive in service by attention at the motive power depot is not always easy to make, but the main factors which have to be taken into consideration are the period out of service for shed repairs; the general condition to which the locomotive can be restored without repairs in the works; and mileage and time the engine will run before requiring further repairs.

Having regard to the equipment normally provided at motive power depots and the comparatively short distances involved between the depots and main workshops, it is a general rule that classifiable repairs, other than changing tubes and so on, should not be undertaken in other than the main workshops. If mileage and periodical examinations, the foundation on which shed maintenance is built up, are thoroughly carried out the need for extensive repairs at low mileage will not arise. Improvements in design of boilers and fireboxes, in their shed maintenance and in the quality of their feed water have, during the past twenty years, considerably increased the period in which boilers can run before requiring a removal from the frame. The frequency of repairs today is governed as much by the mechanical condition of the locomotive as by the boiler. It has been found in many cases, said Mr. Bond, that heavy boiler repairs involving removal from the frame are necessary only at every other periodical repair, while axleboxes, tyres motion, and frames, require attention on each occasion.

The mileage between shop repairs, in which design, workmanship, and organisation all play their part, is most important, but equally so in the provision and maintenance of motive power is that the number of locomotives needed to work a given volume of traffic should be as low as possible. This requires, first, that a high percentage of the total stock should be available for service, and secondly, that locomotives available should be used in working trains as many hours a day as traffic conditions allowed. Close attention paid to this aspect has enabled a marked reduction to be made in the locomotive stock of British Railways, which was 4,605 lower in 1951 than in 1923. The economies in interest and depreciation charges have therefore been considerable.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

Railcar Possibilities in Great Britain

March 11

SIR,—It is surely untrue to state, as in your February 27 issue, that diesel railcars are unsuitable for use in this country, as this type of vehicle can be adapted to meet any requirements. No serious attempt was made to exploit lightweight diesel trains on either the L.N.E.R. or L.M.S.R., and the G.W.R. dispersed its cars widely and was thereby unable to displace any steam power maintenance facilities or improve schedules.

A small basic range of diesel-electric units would allow multiple-unit trains of any length (according to traffic needs) to be operated by a crew of two. Units for various destinations could readily be detached en route and run solo as applies on the Southern Region electric services. Such diesel-electric units are in use in Holland, where, contrary to the views expressed in your article, traffic conditions appear to be very similar to those in this country.

Unless the Railway Executive is prepared to learn by other people's experience and dieselise not only every working possible in a given area, but also put operating and maintenance staff in charge who have the will and the facilities to exploit this form of power, they may as well save our money.

The conveyance of livestock and perishables by passenger train is to be deprecated as it prevents the exploitation of the only advantage of rail transport over road transport, *i.e.*, speed with comfort and safety. Other arrangements are always made for this traffic on electrified lines; why then should an objection be raised in the case of diesel trains?

Yours faithfully,

NOEL DUDLEY

48, Mount Road, Hayes, Middlesex

[It was clearly stated in our article that railcar services in this country have to prove themselves from the commercial, but not from the technical, point of view. There was no unqualified comment that they are "unsuitable for use in this country." The opportunity is being taken now to discover whether developments since the period of the services we mentioned have altered the position.—ED., *R.G.*]

Great Central Route to the Midlands

February 28

SIR,—As a first step towards implementing Mr. J. D. Hewitt's suggestion in your February 27 issue of "pooling" the routes between London and the Midlands the operating of the Great Central should be handed over to the L.M.R., with authority to construct the spurs and connections. The "Master Cutler" is the only real express left to the Great Central, and while this might run over the Midland route south of Leicester, the remaining semi-fasts would still need to run over the Great Central for the sake of stops at Harrow, High Wycombe, Aylesbury, Brackley, Woodford Halse, and Rugby. Concentration of all traffic at St. Pancras in London and at one station at Leicester, Nottingham, and Sheffield, would probably not be possible without considerable development works at these stations.

The greatest benefit would come from using the Great Central to relieve both the Midland route to London and the L.N.W. line south of Rugby, *via* connections near Nottingham, Loughborough, and Rugby, and also near London to restore trains to their parent systems. At the London end the Metropolitan & G.C. Joint, and the G.W. & G.C. Joint lines carry heavy traffic. Widening between Harrow and Rickmansworth will make little difference, as it will be offset by an increased number of electric trains. A connection along the Colne Valley from Rickmansworth to Bushey & Oxhey would divert traffic before the influx of trains from Watford at Moor Park. A burrowing junction at Bushey should present no difficulties; only the Eastbury Road is liable to conflict with the new railway, and, being on the side of a hill, it could be easily lowered. From Bushey to Croxley Junction a new railway, independent of the electric line, would be needed, but west of Croxley Junction down trains would follow the closed L.M.R. Rickmansworth branch, pass under the Metropolitan, and come in by a new spur on the down side at Rickmansworth North Junction. Up trains would take the Watford branch at the same junction, cross by a new spur to the L.M.R. branch at Croxley Green, and so join the down line at Croxley Junction.

Diversion of traffic between London and the North to the Great Central would probably necessitate the provision of loops for the segregation of fast and slow trains. One long loop could be formed by a connection at Brackley with the L.M.R. Banbury branch. Loop traffic would run from there *via* Verney Junction to Quainton Road.

Yours faithfully,

R. G. R. CALVERT

10, Bolton Avenue, Windsor

Diesel and Steam Locomotives compared

March 6

SIR,—With reference to Mr. Roger Boland's letter in your February 27 issue, it is a little difficult to understand why the New York Central 4-8-4 steam locomotive should be able to show a better performance than the 6,000-h.p. diesel-electric locomotive with a 15-coach train. Although no details are given of the 4-8-4 locomotive, I imagine its heating surface to be of the order of 5,500 sq. ft., superheater 2,000 sq. ft., and grate area rather less than 100 sq. ft.

Even with a mechanically-fired grate and allowing for the generally good American boiler performance, one cannot imagine this locomotive having a boiler output and steam cylinder output much in excess of 4,000 h.p. How is it then, according to the figures quoted by Mr. Roger Boland, it is able to give a better performance than the 6,000-h.p. diesel?

One point, of course, which helps the steam locomotive is that it is probably 65 tons lighter than the three-unit diesel. In spite of the fact that diesel-electric locomotives are able to use their full output up to top speeds, it seems more than likely that top speed means on this particular locomotive, something less than the 100 m.p.h. quoted by Mr. Boland, and that output began to fall off at, say, 90 m.p.h. I estimate that at 100 m.p.h. with the 15 coaches 4,000 h.p. would be required to balance tractive resistance.

Whilst on the subject of power at high speed, I would like to comment on the information given in your February 20 issue. When the new Co-Co locomotives of the S.N.C.F. are taking a train of 700 tons up a grade of 1 in 125 at 82 m.p.h., they are giving out an output of about 5,500 h.p. and when taking this train on the level at 100 m.p.h. the output must be of the order of 4,000 h.p., truly remarkable achievements for a 106-ton locomotive, rated continuously at 4,400 h.p. Thus has been solved the problem of getting overload outputs at very high speeds with high voltage d.c. locomotives.

As regards the performance of the German Bo-Bo locomotives described in the same issue, in taking a train of 700 tons up a 1 in 100 grade at 56 m.p.h., as the rating of the equipment is kept within the continuous rating, one would expect this a.c. locomotive to be able to exceed its continuous output at this speed and go up the grade at about 75 m.p.h. with the 700-ton train. This is assuming that at 56 m.p.h. the motors are not connected to the last transformer tap.

Yours faithfully,

H. CHARNLEY

Brook House, Clayton-le-Woods, Lancs

THE SCRAP HEAP

Interest Value

A 100 year-old Nova Scotia Railway ticket almost dislocated the C.N.R. accounting system one day recently. In a letter written to Mr. Donald Gordon, Chairman & President, C.N.R., enclosing a 19th century ticket from Truro to Truro (by way of many other Maritime centres), Mr. A. K. Cameron, of Westmount, Que., wondered if he could have a refund "in sterling of equivalent value of that time." Fearing that payment of the refund with compound interest all at once "would bankrupt the company," he said he would accept "a slow note with a low rate of interest providing the initial payments were substantial."

Mr. Gordon replied: "If you will accept my deepest thanks as a 'substantial initial payment' I can assure you that the ticket will draw an extremely high rate of interest from thousands of Canadian people who, we hope, will eventually be able to view it in the museum we are now in the course of preparing for the presentation of just such memorabilia."

East Indian Railway Inauguration

The extract below from the Calcutta *Morning Chronicle* is believed to be the first notification in the Press of inauguration of passenger services on the East Indian Railway.

East Indian Railway.

ON and after Tuesday the 15th Instant, Trains will leave Howrah and Hoogly stopping at Bully, Serampore, and Chandernagore, at the following hours.

	h. m.	h. m.
From Howrah	10-30 A. M.	and 5-30 P.M.
,, Hooghly	8-23 A. M.	and 3-38 P.M.

On and after the 1st September the Trains will run between Howrah and Pundooah, stopping at all the Stations.

The Carriages to be used as first Class Carriages for a short time, will be superseded by a superior description of Carriages now in course of construction.

Parties wishing to avail themselves of Monthly or Season Tickets at reduced rates are requested to apply at any of the Stations for forms, to be filled up in writing and forwarded to the Managing Director and Agent.

The Official inauguration of the Railway, has been deferred, with a view to the public convenience, to Monday the 1st January 1855, when the Line will be opened to Raneegunge, 122 miles, and due notice will be previously given of the arrangements which have been made for the purpose.

R. MACDONALD STEPHENSON,
Managing Director and Agent.

29, Theatre Road, Calcutta, August 7, 1854. (841)

There are today ten additional stations between Howrah and Hooghly, and some 50 booked passenger trains each way daily between Howrah and Bandel, the station next beyond Hooghly, including nonstops, conveying a heavy suburban traffic. This and all other Calcutta suburban lines now form part of the Eastern Railway.

More Initial Meanings

(*See The Scrap Heap for February* 20)

Sometimes the newly grouped companies came off worse than their predecessors. Though merely More Room or Many Ramifications served for the M.R., the L.M.S. was Lazy Mucky & Slow. . . . The G.C.R. seems to have had its sobriquet conferred on it by shareholders rather than by customers —and by reference to history. For the Manchester Sheffield & Lincolnshire had got the name of Money Sunk & Lost: so the G.C. became Gone Completely.

Down south, the South Eastern & Chatham soon became Slow Easy and Comfortable, which, was at least two-thirds complimentary, and better than the Linger Crawl & Delay allotted to the London Chatham and Dover. But smaller lines were treated with even less respect, as in Slow & Dirty for Somerset & Dorset or Come Bask Amid Summer's Ceaseless Rains for the Cork Bandon & South Coast Railway . . . A predecessor of the G.W.R., the Oxford Worcester & Wolverhampton, was known as the Old Worse & Worse. More happily the Manchester line once well known as the M.S.J. & A.R. achieved an uncritical Many Short Journeys and Always Ready.—*From "The Manchester Guardian."*

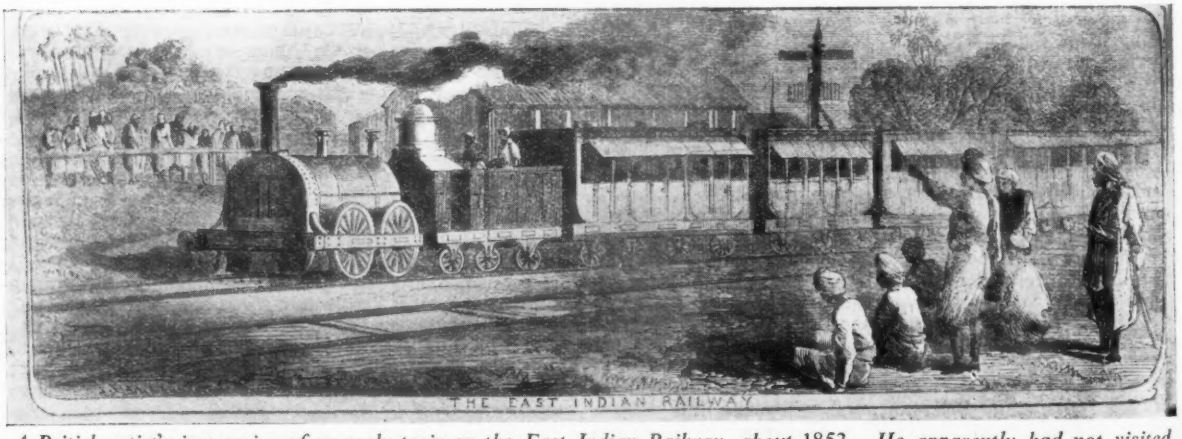
Our Masters' Voices

The language in which officialdom communicates to the public its behests, its cautions, and its vetoes varies widely both in different parts of the world and as between different authorities in the same country. "*Nicht Hinauslehnen*" is considered sufficient to stop a German from sticking his bust out of the train window; to an Italian an approach at once more rational and less peremptory needs to be made by explaining that it is "*Pericoloso sporgersi.*" It is doubtful if any European nation has excelled in grace, consideration, and urbanity the terms in which French travellers used to be warned against descending too precipitately from trains: "*MM. les Voyageurs sont prévenus qu'avant de quitter l'abri de la voiture dont ils sont en train de descendre, ils devront s'assurer au préalable qu'aucune voiture venant en sens inverse n'est à proximité.*"—*From "The Times."*

Life Beside the Lines

Railways that enter a city are nearly always flanked by industrial plant, or the back gardens of small houses. These forms of growth could not have occurred unless at some period between the late 18th and the middle of the 19th centuries, the English, as a nation, had become deaf as well as blind. Unplanned industrial areas intermingled with residential and civic areas in a city are an offence to the eye; noisy railways bordered with residential development are an assault on the ear. Only where the railway actually penetrated an existing city were areas cleared or tunnels made for its entry; but . . . . nearly all the railways passed through areas that were not developed, either residentially or industrially, and their presence promoted both forms of development indiscriminately. — *From "2,000 Years of England" by John Gloag, published by Cassell & Co. Ltd.*

Early East Indian Railway Train—as Imagined by an Artist



A British artist's impression of an early train on the East Indian Railway, about 1853. *He apparently had not visited India and certainly not the E.I.R., as the illustration of the first passenger locomotive on page* 330 *shows*

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

NEW ZEALAND

Christchurch-Dunedin Night Service

A night service between Christchurch and Dunedin will begin in April. Steam heated coaches will be attached to an express goods train on alternate nights. Stops will be made at Ashburton, Timaru, Oamaru, and Palmerston.

SOUTH AFRICA

Longer Service from Tarpaulins

The S.A.R. has 104,000 tarpaulins in use, an increase of almost 60 per cent. in eight years. The value of stock is more than £2,500,000.

Because of the continually rising cost of new tarpaulins, the administration has been experimenting for some time to prolong the life of the existing stock. These measures have been so successful that tarpaulins now last 5½ instead of 3½ years, and at least £903,000 has been saved over the past eight years.

At first, it was decided to reproof tarpaulins after 15 to 18 months' service and then again at intervals of twelve months. The first attempts were only moderately successful but the Administration persisted and reproofing was intensified. The results are now regarded as most satisfactory. Proofing and reproofing are carried out departmentally or by private enterprise under contract.

Tarpaulin depots have been established by the railways at Durban, Kazerne, Noupoort, East London, Port Elizabeth and Cape Town. Recent tests of tarpaulins in use over a period of years indicate that the life span can be increased to six years and as from April this year the Administration will act on this basis.

UNITED STATES

All-Dome Cars for the Santa Fe

Eight double-deck dome cars on order for the Atchison Topeka & Santa Fe Railway are to be distributed between the all-coach "El Capitan," operating between Chicago and Los Angeles, which requires four complete train sets to maintain daily service on its 39¾-hr. run, and the "Kansas Cityan" and "Chicagoan," operating on 15-hr. schedules between Chicago, Kansas City, and Oklahoma City.

These cars will be of the all-dome type, like those of the Milwaukee, described in our March 13 issue, in which the dome section extends for the full length of 85 ft. The Santa Fe cars will accommodate 57 chair car seats and an 18-seat refreshment lounge. In the depressed centre of each car between the bogies there will be a 28-seat cocktail lounge, and a nurse's room equipped for treating minor ailments and storing and heating children's food. Equipment usually carried underneath the frames will occupy special rooms at the ends of the car, above the bogies.

Each car will weigh 92½ tons. Because of this considerable increase over normal coach weights it will be supported on six-wheel in place of four-wheel bogies. Tinted glass, of a type that filters the sun's heat, will be used for the double-glazed dome windows, and a special form of air-conditioning will regulate the air circulated through the dome in direct relation to the amount of sunshine. The construction of the new stock throughout will be of stainless steel.

Television in Railway Service

A demonstration of possible uses of television in railway operation was given recently by the Victor Division of the Radio Corporation of America in the Barr Yards, Chicago, of the Baltimore & Ohio. Three of the newly-developed Vidicon-type industrial type televisors were installed, and enabled the personnel in the yard offices, without leaving their rooms, to carry out duties, that normally would require, not only a good deal of walking, but also additional wagon movements. In particular, instead of a shunter having to walk the full length of an incoming freight train to note the wagon numbers, for transmission to the control tower before marshalling began, he was able to sit in comfort before a television screen which exhibited the numbers one by one as a train moved slowly past a small unattended television camera.

CANADA

Railways and St. Lawrence Seaway

The Hon. Lionel Chevrier, Minister of Transport has said that Canadian railways have not opposed the St. Lawrence Seaway but United States lines "are among the project's bitterest opponents." The Canadian railways expected to lose some traffic directly to the seaway, but they looked for a steady industrial growth in the whole St. Lawrence Valley from Prescott, Ontario, to Nicolet and Three Rivers, Quebec. The Minister said he was confident that the seaway would bring much new business to the railways and stimulate the industrial activity of the whole area affected.

ARGENTINA

"El Ranquelino" Express

The D.F. Sarmiento Railway has introduced a new weekly express named "El Ranquelino" between Buenos Aires, Bragado, and Colonia Alvear, running once a week and composed of the new rolling stock recently received from Werkspoor.

Presidential Visit to Chile

On his recent official visit to Chile, President Perón used a special train composed of sleeping cars of the General San Martín Railway and an air-conditioned dining car of the General Mitre Railway. The train left Presidente Perón terminus in Buenos Aires of the General Mitre Railway and ran over the recently built single line connecting with the General San Martín Railway. This line, although completed some months ago, has not yet been used in regular service.

New Stock, General Urquiza Railway

The General Urquiza Railway has placed in service 15 locomotives constructed by Henschel. Electric stock recently acquired in the United States is being put on the Federico Lacroze-Pereyra service.

Technicians to Visit Netherlands

A group of railway technicians headed by Señor Miguel Luis Mario Baiardino has left for the Netherlands to inspect the progress being made in the construction of locomotives and rolling stock for Argentina by Werkspoor N.V.

VENEZUELA

Barquisimeto-Puerto Cabello Line

It is understood that a United States firm has completed plans for a railway between Barquisimeto and Puerto Cabello. It will be 112 miles long, and will include eleven stations and 26 bridges.

ITALY

Bologna-Venice Electrification

Electrification of the 93-mile Bologna-Padua-Venice main line has been decided on and work is to begin without delay.

Electrification in Sicily

The conversion of the second section of the Messina-Palermo main line, the 23-mile section between Patti and Sant' Agata di Militello, has been completed. Regular electric working will begin on April 15. The Minister of Transport; Signor di Raimondo (General Manager of the State Railways); and the chief of the Sicilian Regional Government will attend an inaugural ceremony at Sant' Agata di Militello.

Patti is some 43 miles to the west of Messina. The extension of electric traction to Sant' Agata di Militello will enable the travelling time of the fast trains between Messina and Palermo to be reduced by about 80 minutes. At present, the fastest trains take 5½ hr. to cover the 144 miles between Messina and Palermo.

The first section of this coast line, Messina - Barcellona - Castroreale, some 30 miles, was electrified by the middle of 1951. It is expected that the electrification of the whole line will be completed in late 1954. The Palermo-Sant' Agata di Militello section is 78¼ miles long; as far as Fiumetorto, 26¼ miles,

the line is to be doubled at the same time as it is used also by trains from Palermo to Catania which diverge at Fiumetorto on to the inland line via Caltanissetta and Enna.

The completion of electrification of the Messina-Palermo main line is to be followed by the electrification of the Messina-Catania main line, 56 route-miles, and subsequently by that of the Catania-Syracuse line, a further 55¼ route-miles. The Catania - Enna - Caltanissetta - Roccapalumba - Fiumetorto line, 124 route-miles, and of the branch from Roccopolumba, south of Fiumetorto, to Agrigento, in the south of the island, are also scheduled for electrification.

AUSTRIA

Brenner Tunnel Scheme

Plans for a tunnel under the Brenner Pass were discussed recently at Munich at a conference at which Austrian, Italian, and Western German railway and commercial interests were represented.

The scheme is for a nine-mile, double-track tunnel to replace the existing double-track line over the summit of the pass, 4,500 ft. above sea level. The promoters of the scheme maintain that a return on the capital cost of the tunnel would be derived from economies in operating heavy freight traffic; the tunnel would be some 900 ft. below the summit, which would obviate the existing steep gradients. The north portal would be at Steinach-in-Tirol, 14 miles south of Innsbruck, and the south at Colle Isarco, ten miles south of Brennero, the Austro-Italian frontier station at the summit of the pass.

The Brenner line between Innsbruck (Austria) and Bolzano (Italy, formerly Bozen, in the Austrian Empire) was opened in 1867. It is electrified throughout, and electrification of adjacent lines gives electric traction through from Nuremberg *via* Munich, Kufstein, Innsbruck, Bolzano, Verona, Bologna, Florence, Rome, and Naples to Reggio, terminus of the train ferry over the Straits of Messina to Sicily, some 1,150 miles.

SWEDEN

Baltic Train Ferries

Allusion was made in our February 6 issue to Trelleborg as the Swedish terminus of the prewar train ferry to Sassnitz, now in the Russian Zone of Germany, by which through sleeping cars worked between Stockholm and Berlin *via* Malmö. Trans-Baltic train ferries still have Trelleborg as their Swedish terminus.

One ferry boat, which conveys Stockholm-Warsaw sleeping cars, plies between Trelleborg and Odra (near Swinemünde) in Poland; the other, by which a weekly through sleeping-car service is maintained between Stockholm and Berlin, works to and from Wärnemünde, which is situated in the Russian Zone, though Sassnitz was the southern terminus until October last.

IRELAND

Diesel Specials

A special non-stop excursion train ran from Sligo to Dublin for a Rugby match on March 8. It consisted of two diesel power units with a buffet car and intermediate coach. The train left Sligo at 9.15 a.m. and reached Dublin Westland Row at 12.45 p.m., returning at 8.15 p.m. This was the first non-stop run between Sligo and Dublin, and was also the first occasion on which the diesel units were used on an excursion train.

Publications Received

Die Umgrenzung des Lichten Raumes Bei Regel-Und Schmalspurbahnen. (Loading and Construction Gauges of Standard and Narrow Gauge Railways.) By L. Hechler. Berlin and Darmstadt. Otto Elsner Verlagsgesellschaft. 8½ in. × 6 in. 372 pp. Price DM 24.—This is the second edition of a handbook specially designed to assist engineers to understand the regulations governing the limits within which wagons may be loaded, rolling stock constructed and works along the railway built, without infringing any officially prescribed dimensions. It is illustrated by an extensive series of diagrams of clearances and tables of measurements governing every aspect of the matter, as far as Germany itself is concerned and gives in addition much information referring to some 23 other countries, the result of considerable research. It will be welcomed by all who have to forward goods, manufacture rolling stock, carry out engineering works for railways or supply items such as signal posts and gantries for location alongside the track.

A Century of Progress.—The firm of James Austin & Sons (Dewsbury) Limited was first established in 1850, and a record of progress and attainment over the past 100 years is contained in an illustrated book it has now issued. Founded in 1850 by James Austin, the first 50 years formed a period of continuous progress which necessitated larger premises to keep pace with production needs. To meet the changing conditions at the beginning of the present century, a private company was registered on June 24, 1903. In 1927 the firm purchased the site of the old Thornhill Iron & Steel Works, and an entirely new works was erected and an efficient plant was installed for fabricating and stocking of iron and steel. In 1948 the business of A. J. Riley & Sons Ltd. was acquired and the manufacture of colliery equipment and coke oven rams was added to the firm's activities which include water softening plant; riveted and welded structures and so on, many of which are illustrated.

Electrically Welded Products.—Essential features of a wide range of electrically-welded products which include oil and petrol tanks of varying capacities up to 12,500 gal., stationary and mounted on railway wagons, are contained in the 1952 edition of Welded Fabrications, issued by Robert Jenkins & Co. Ltd. Particulars are also included of stainless steel mixers, monel metal dryers, compressed air receivers, and so on, all of which are illustrated. A number of useful charts and graphs pertaining to cylindrical tanks and hot oil circulating are included together with illustrations of works layout and equipment.

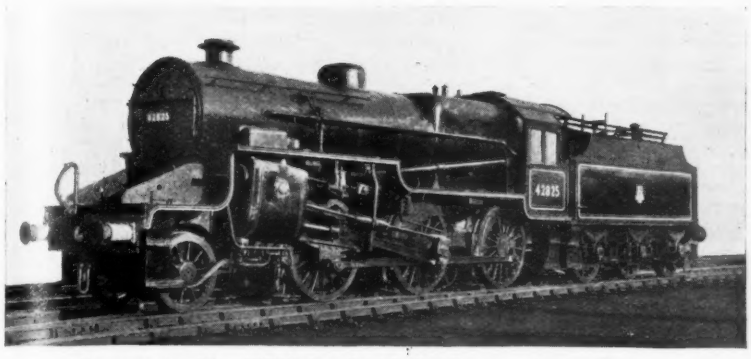
Morgan Crucible Furnaces.—A series of catalogues has been issued recently by the Morgan Crucible Co. Ltd., giving the principal characteristics of various types of furnaces. They include the Bale-out crucible furnace, which is oil, gas, or coke-fired and has been specifically designed for the die-casting industry; and the control axis tilting furnace, oil or gas fired model. Particulars are also given of the "LO," lift-out type, oil or gas fired, which will handle melts ranging from light-alloys to special irons and steels, and in various capacities for non-ferrous metals up to 350 lb. for brass. The catalogues are illustrated with diagrams and dimensions for installation purposes, with capacities of each type.

French National Railways Travel Literature.—An illustrated booklet of considerable artistic merit, "France, the Land for Holidays," is an outstanding example of travel literature for the 1953 holiday season distributed by French Railways Limited, 179, Piccadilly, London, W.1. There are reproductions of paintings by Roger Lezombes and striking half-tone illustrations of holiday travel scenes and resorts in many parts of France. Schematic maps show the main French railway and motorcoach tourist routes, and the routes of the principal European expresses starting from Paris. Other publications include coloured map folders giving details of each of the tourist regions of France.

Holidays in Scandinavia and in Belgium, Holland, and Luxembourg.—Two 1953 season holiday programmes of Thos. Cook & Son Ltd., one covering Scandinavia and the other Belgium, Holland, and Luxembourg, offer the usual wide variety of holidays. In Norway holidays can be taken in coastal, fjord, and mountain resorts ranging from the land of the midnight sun to the coast of the Kattegat, and the Swedish lake and seaside resorts and those of Denmark offer their own attractions—besides those of the three Northern capitals. The cities and seaside resorts of the Netherlands and Belgium offer holidays to suit widely differing tastes, as do the scenic charms of the Grand Duchy of Luxembourg.

Rotary Valve Gear on L.M.R. Locomotives

Reidinger RR poppet valve gear fitted to five British Railways engines



Locomotive No. 42825 fitted with Reidinger rotary valve gear

THE London Midland Region, British Railways, is fitting five two-cylinder class "5MT" (Horwich), locomotives with Reidinger RR rotary valve gear, and the first to be completed, No. 42825, is now in service. This development follows tests made with a North Eastern Region, three-cylinder 4-4-0 class "D.49" locomotive, No. 62764 *The Garth*, which was fitted with this poppet valve gear in 1949. Following tests with the locomotive at Rugby locomotive testing station, and after three years' service in passenger traffic, Mr. R. A. Riddles, Member for Mechanical & Electrical Engineering, Railway Executive, decided to fit five London Midland locomotives with this type of valve gear.

Four locomotives will have camshafts fitted with cams providing a pre-determined steam distribution as ascertained by trial with *The Garth*, and the fifth will be equipped with vernier adjustable cams so that alternative independent valve settings may be made and their effects investigated in a two-cylinder locomotive. The valve gear being fitted to these engines was evolved and designed by Mr. A. Reidinger, of Rendel Palmer & Tritton, and Technical Adviser to Locomotive Valve Gears Limited.

Design Particulars

The object of the valve gear is to increase the thermal and mechanical efficiencies of the steam locomotive in a simple, direct, and positive manner by improving the steam distribution, reducing maintenance costs, and increasing both power and availability. The drawings of the valve arrangement accompanying this article show that the cylinders have valve chambers at each end, housing in each, one inlet and one exhaust valve, which are in this instance arranged in the horizontal position, which allows the valves to be withdrawn for examination when necessary without disturbing the camboxes, the main drive, or the reversing gear connections.

The valves are of the double-beat type, giving large openings for a relatively small lift, thus maintaining moderate roller and cam contact pressures. The inlet valves are steam pressure-operated in place of the usual spring control, but the exhaust valves have controlling springs, and are continuously actuated by the cams. This arrangement provides an effective automatic by-pass when coasting, and renders the use of special drifting or by-pass devices unnecessary.

The camboxes are placed between the valve housings and bolted to the top of the cylinder barrels with the axis of the camshafts at right angles to longitudinal centre-line of the cylinders. The camboxes are self-contained complete assemblies, each comprising a camshaft with inlet and exhaust cams with wormwheel drive at the outer end, intermediate lever assemblies and reversing gear.

The main drive comprises a wormwheel gearbox, mounted on a return crank on each side of the engine and fitted with floating rods to counteract the torque and having universal shafting with flange connections to the cambox wormshaft. The reversing gear consists of a universal shaft connecting the control in the cab with a self-locking reduction gearbox, which securely holds the gear in its set position, bevel gearboxes and inter-connecting shafting with the camboxes on each side of the engine.

When the engine is stationary, the inlet valves are in the open position. On opening the regulator, steam passes through piping from the regulator valve to the valve closing pistons in the valve covers, thus bringing the valves under the control of steam pressure acting to close them and at the same time bringing the valve spindles into positive control with the cams through the tappets in the sides of the camboxes.

The exhaust valves are at all times actuated and positioned by the exhaust cams. Pressure is not used to control the exhaust valves because of the difficulty of maintaining a steam-tight packing for actuating pistons which, unlike the pistons controlling the steam

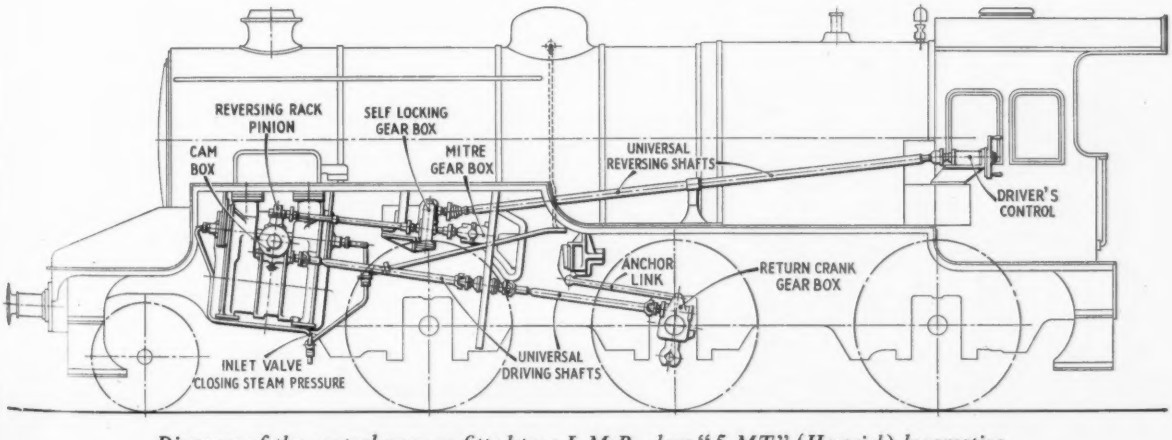
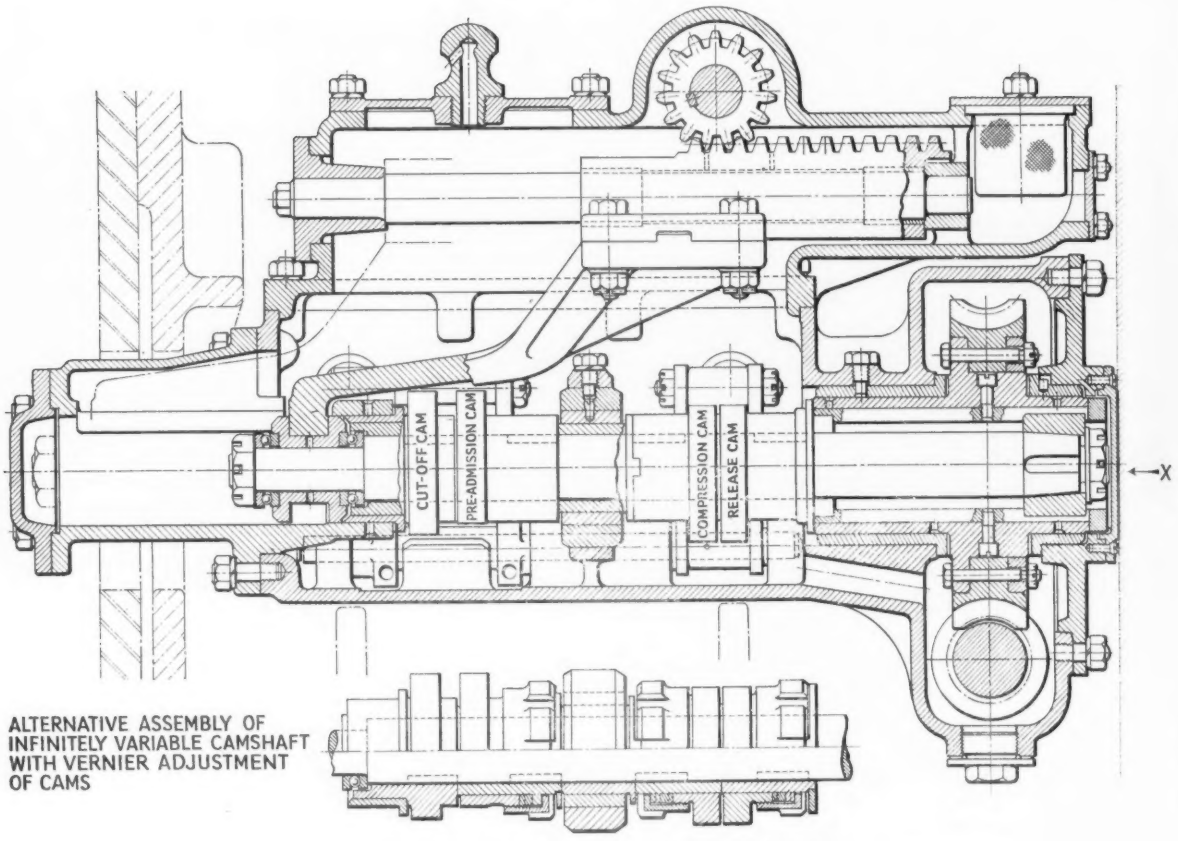


Diagram of the control gear as fitted to a L.M.R. class "5 MT" (Horwich) locomotive

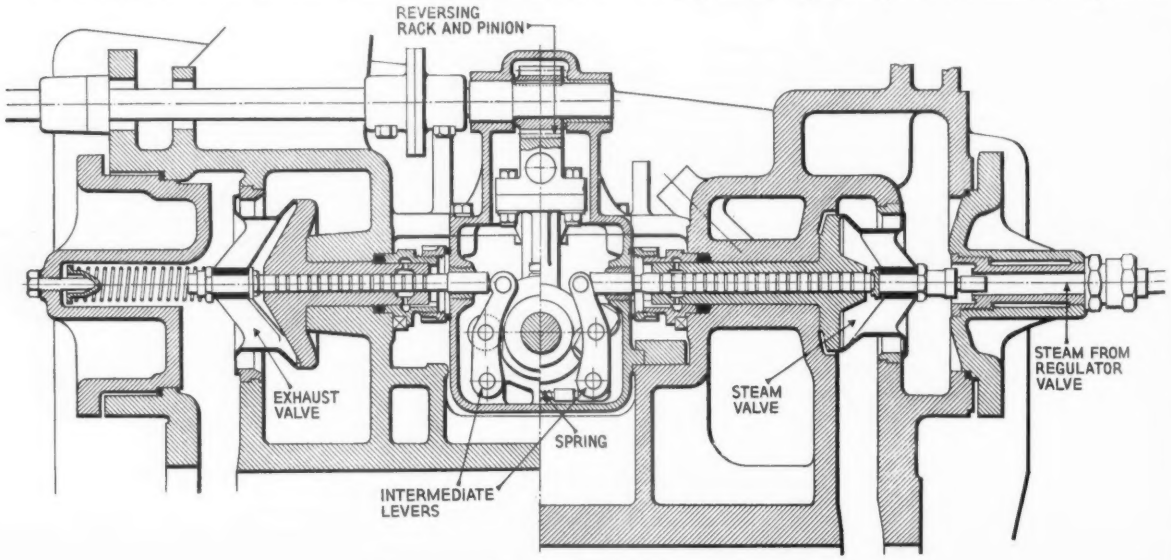


Sectional arrangement of cam box outside drive

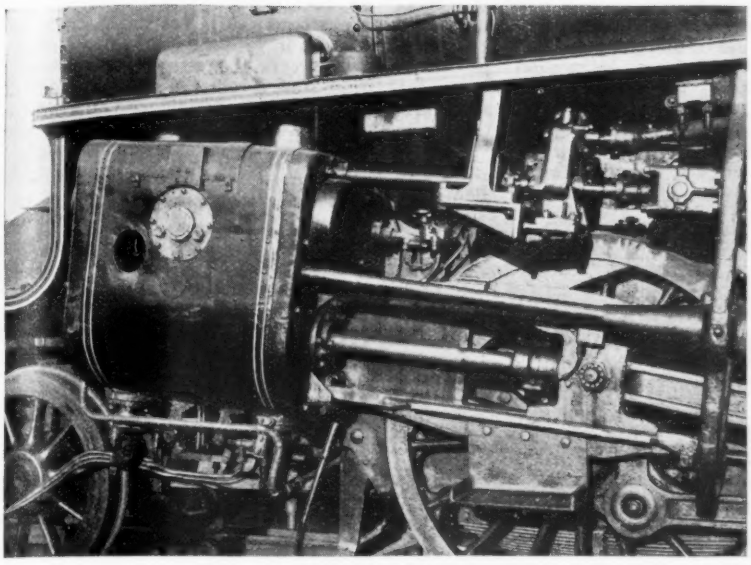
inlet valves, is clearly essential in the case of the exhaust valves. This arrangement also makes the engine more responsive to the regulator, because the exhaust valves are at all times correctly positioned in relation to the cams.

The camshafts rotate at the same speed as the locomotive driving wheels and are driven by a dog having helical keys engaging with helical spline-ways in the inner driving sleeve. One key and spline-way is made a different width from the others to ensure that the camshaft can only be fitted in its correct position in the driving sleeve. The main drive wormwheel is mounted on and bolted to the driving shank in the bore of which is fitted the inner splined sleeve.

The camshaft is splined in such a manner as to impart angular movement to the cams assisted by the helical spline-ways in the inner driving sleeve.



Arrangement of steam and exhaust poppet valves



A close-up of the rotary valve gear mechanism

Reversal or adjustment of cut-off is attained by moving the camshafts in an axial direction, which movement draws the camshaft through the cams, when the splines which engage keys in the bores of the cams cause the cams to move in an angular direction relative to each other.

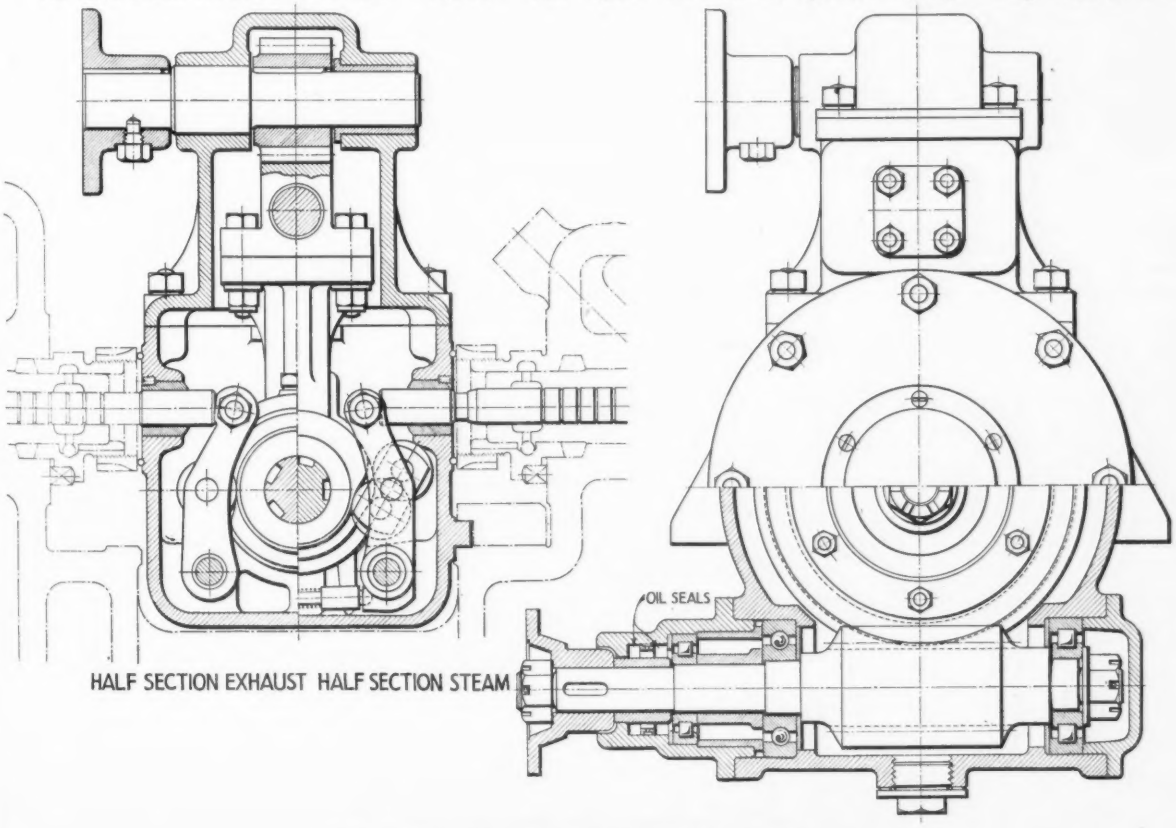
All valve events are based on the cut-off cam, and for any cut-off the pre-admission cam opens the inlet valves for admission and, as the cut-off is shortened, pre-admission becomes earlier and "lead" is increased. For all running cut-offs a full valve lift and therefore a full port opening for steam inlet is obtained. For any cut-off, the "release" cam opens the exhaust valves fully and, as the cut-off is shortened, release gradually becomes earlier, but it is always later relatively to that obtained with link motion gears. Shortening the rate of cut-off causes the exhaust valves to close earlier, thus positively controlling the point of compression relative to the cut-off.

Details of Assembly

There are four intermediate lever assemblies in each cambox, one for each valve spindle tappet working in circular guide bushes fitted in the sides of the cambox. The intermediate levers are fulcrumed at their lower ends working on rods fitted in the bottom of the cambox, one on each side. At their upper ends the levers contact the cambox tappets. These levers increase the lift of the valves over that given by the form of the cams, to give a direct thrust on the tappets and to carry the follower rollers which run on the cam profiles.

The steam inlet levers are fitted with a rocking beam having two rollers, one at each end of the beam, one running on the cut-off cam and one on the pre-admission cam. This arrangement is necessary on account of the differential cam action and the relatively large angular displacement given to these cams, when the gear is reversed from forward to backward gear, or *vice versa*, or when altering the rate of cut-off.

The levers are fitted with coil compression springs acting between their



Cross-sectional arrangement of cam box, outside drive

lower ends. These springs act to keep the follower rollers in constant contact with the cams at all times. This arrangement on the steam inlet side is required because valve control springs are not used, the valves being steam-controlled.

On the exhaust side, the intermediate levers also have two rollers, one for each of the exhaust cams, though, in this case, they are not fitted on a rocking beam, this not being required because of the small angular displacement of these cams in relation one to the other.

As already stated, valve control springs are fitted on the exhaust side in the valve covers which act on the valve spindles to keep the follower rollers of the intermediate levers in contact with the cam profiles. The valve spindles are mechanically lubricated and the lubrication of the camboxes, return crank gears and also of the reversing camboxes is effected by the oil-bath method. The Reidinger poppet valve gear is supplied by Locomotive Valve Gear Limited, London, and was made by J. L. Jameson Limited, Engineers, of Ewell, Surrey.

Overhaul for Colchester Turntable

Repairs to unit built at Stratford in 1914

The turntable being repaired in the boiler shop at Stratford

THE 65-ft. turntable at Colchester Motive Power Depot, which is capable of turning the largest locomotives in use on the Liverpool Street-Norwich main line, recently became due for a thorough overhaul. The turntable was built in the Stratford Works of the former Great Eastern Railway in 1914, and is noteworthy as it is usual for turntables to be constructed by private engineering firms rather than in railway workshops.

On Sunday, February 1, breakdown cranes from Stratford and Cambridge lifted the turntable from its pit and loaded it on to a flat wagon for conveyance to Stratford Works.

The overhaul will occupy approximately nine weeks and involves the removal of all brackets and fittings for reconditioning, and the thorough examination and painting of the main girdles and cross bracing. Until the turntable is back in operation it will be necessary for locomotives to be turned on the nearby triangle between Hythe and St. Botolphs.

An additional point of interest is that both Clacton and Parkeston Depots were cut off by floods on the same day that the turntable was removed. The heavy strain which was thrown on the Colchester Motive Power Depot in providing engines and men to work the resultant emergency services was not eased by the lack of a means of turning engines within the depot, and it reflects credit on all the staff concerned that every demand was met.

FIFTY YEARS OF B.E.A.M.A.—Fifty years of industrial history are recalled in a booklet, "The B.E.A.M.A.: A Short Account of its Growth and Activities," issued by the British Electrical & Allied Manufacturers' Association. This 48-page publication outlines the development of the Association, its constitution, its present-day activities, and the co-operative efforts of its members which have made the electrical industry the second largest exporter of British products and a powerful influence for national progress.

SUMMER AIR SERVICES.—The British European Airways Waterloo Air Terminal will be formally opened on May 19, handling traffic commencing at 7 a.m. that day; motorcoach departures for Northolt are expected to be 75-80 min. before aircraft departure time, and for London Airport 80-85 min., five minutes earlier for international flights in either case. In the case of bookings to and from Biarritz in connection with flights to Bordeaux, it has been decided not to provide a road connection between Bordeaux and Biarritz this summer as last year's experience showed that most passengers preferred to cover this sector by fast train; summer flights between London and Bordeaux have therefore been timed to give good connections with trains between Bordeaux St. Jean and Biarritz.

NEW SIGNALBOX AT TEBAY, L.M.R.—A new signalbox at Tebay, recently brought into operation by the London Midland Region, replaces a structure erected more than 50 years ago. The new box contains a 50-lever standard type locking frame. Track-circuiting is installed, and sufficient spare levers have been embodied to cater for the ultimate abolition of Tebay No. 3 box on the branch line to Kirkby Stephen. The new signalbox is built of brickwork and timber, with a flat timber roof supported by a box beam and hardwood posts. The main cabin window is of hardwood, specially designed with light sections to give maximum visibility; sliding sections facilitate cleaning from the inside. Considerable steelwork has been saved by substituting timber. Central heating, thermostatically controlled, is provided. Cantilivered concrete steps give access to the operating floor. An amenities bay provides cooking, washing, and toilet facilities.

SPECIAL TRAINS FOR CORNISH BROCCOLI.—Special trains are being run by the Western Region for carrying the large crop of Cornish broccoli now being harvested. As many as ten special trains with crated broccoli for markets as far afield as Bristol, London, Birmingham, and Manchester have left Cornish stations in one day. The total amount of broccoli conveyed by Western Region from Cornwall in the past month exceeded 5,800 tons, which included 2,376 tons in one week.

Dutch Electric Train and Locomotive Performance

Rapid acceleration on short point-to-point runs

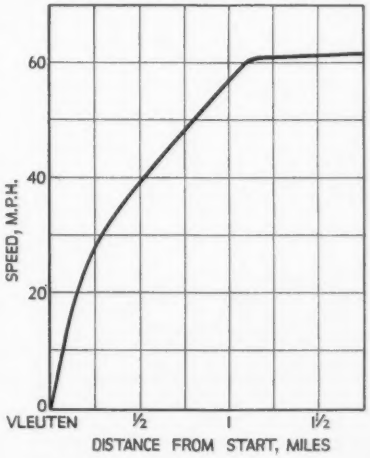
By P. W. B. Semmens

THE Netherlands Railways have made a remarkable recovery since the war, and during the last few years electrification of the main lines has been rapid. Many of the electric services are worked by 2-, 3-, 4-, and 5-coach multiple-unit streamline stock, first introduced in 1935. The general maximum speed permitted on the main lines is 74½ m.p.h. (120 km.p.h.) and this must be reached or even slightly exceeded on the majority of the inter-station sections. For instance, the standard timing over the 15·2 miles from Leiden to Heemstede-Aerdenhout is 17 min., corresponding to a start-to-stop speed of nearly 54 m.p.h., in spite of the cautious running at Leiden necessitated by construction work for the new station. This section line is virtually level, and on one occasion, two 5-coach units together with a streamline T.P.O. trailer coach, ran the distance in 14 min. 30 sec., after a late start from Leiden, raising the start-to-stop speed to 62·9 m.p.h. Ten miles were recovered at an average of 78 m.p.h.

Each of the eight motors of the 5-coach units is rated at 240 h.p., giving a total of 3,840 h.p. for the train under consideration. With a similar load behind a locomotive, the speed of 78 m.p.h. would correspond to an output of 1,550 horsepower at the drawbar, so the units clearly have plenty of power in reserve.

The rate of acceleration of the streamline units, under automatic control, is high. The accompanying diagram shows the acceleration of a six-coach train starting over level track from Vleuten on the line between Utrecht and Rotterdam. The train consisted of one twin- and one four-coach unit totalling 254 tons tare, with a total of twelve 240 h.p. motors. The maximum speed permitted on this line is 62 m.p.h. (100 km.p.h.), and this was practically reached within 2 min. of the start.

Table 1 gives the details of another fast run with the streamline stock, from Arnhem to Utrecht. The immediate start is up a gradient of 1 in 301 for the first two miles, and the two 4-coach units and the T.P.O. coach accelerated up this to 72 m.p.h. The line then falls generally, initially at 1 in 452/596, after which there is a slight rise before the final 1 in 311 descent to Ede-Wageningen, over which the train was slowing down for the stop. The average speed (start-to-stop) was 54·1 m.p.h. for the 10·3 miles, compared with the 47·5 m.p.h. schedule.



Acceleration of six-coach, 254-ton, train on level track from the start at Vleuten

On the next section a severe slowing from 70 to 15 m.p.h. occurred over an underline bridge undergoing repairs, but owing to the rapid acceleration afterwards, the check cost only 2½ min. There is an easy start at 1 in 221/304 down for the first 1½ miles from Ede-Wageningen, but subsequently there are no gradients steeper than 1 in 500. The net time between Ede-Wageningen and Driebergen-Zeist was 17 min. for the 17.9 miles, corresponding to a net average of 63·2 m.p.h. The final approach to Utrecht was very cautious, owing to the complicated junctions, and the need to draw up with the T.P.O. coach in the correct position for the easy transfer of mails to other trains. This journey, incidently, took place after dark.

In 1951, the Netherlands Railways took delivery of a number of coaches for use on express trains from Amsterdam to Maastricht, Heerlen, and Enschede, and from The Hague to Leeuwarden, and Groningen. The 2,500-h.p. Bo Bo electric locomotives built in France by Alsthom are used on these trains, which are timed very smartly. The overall speed between Amsterdam and Maastricht, inclusive of the five stops, is 47·6 m.p.h. The longest stop, lasting 4 min., is at Sittard to uncouple the Heerlen portion.

Table 2 gives the details of a run on one of these trains, loaded to 412 tons as far as Sittard. The line is practically

TABLE 1

Netherlands Railways : Arnhem-Utrecht.
Two 4-coach multiple-unit streamline sets, and T.P.O. coach, 379 tons tare, 400 tons gross.

Dist.	—	Times	Speeds
miles		min. sec.	m.p.h.
0·0	ARNHEM	0 00	—
2·6	Oosterbeek-Hoog ...	4 33	72
4·9	Wolfheze	6 22	74
10·3	Ede-Wageningen ...	11 25	80*
4·4	Veenendaal-de Klomp	5 ₹52	70*
		P.W.S.	15
11·6	Maasbergen	13 26	75
14·0	Maan	15 21	74
17·9	Driebergen-Zeist ...	19 31	—
6·6	UTRECHT	9 37	73*

* Maximum speed before slack

TABLE 2

Netherlands Railways : Amsterdam-Maastricht.
Locomotive : Bo-Bo No. 1135.
Load : To Sittard, 9 coaches, 412 tons tare, 425 tons gross.
To Maastricht, 5 coaches, 239 tons tare, 250 tons gross.

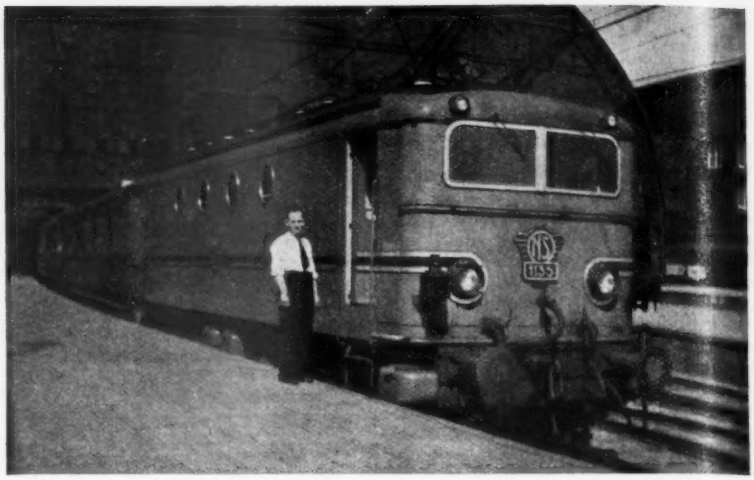
Distance	—	Booked times	Actual times	Speeds
miles		min.	min. sec.	m.p.h.
0·0	AMSTERDAM CENTRAL	0	0 00	—
3·6	Amsterdam Amstel	9	7 56	—
5·8	Abcoude		7 34	65
20·8	UTRECHT	23	22 58	72*
11·3	Culemborg		14 14	63
			P.W.S.	
16·1	Geldermalsen		19 49	62
22·0	Zaltbommel		25 33	60
29·8	'S HERTOGENBOSCH		34 46	62*
			p.w.s.	
37·4	Boxtel		44 09	—
43·5	Best		51 52	74
49·9	EINDHOVEN	58	58 33	77*
17·9	Wert		18 13	68
32·9	ROERMOND	36	33 59	63*
8·3	Echt		9 00	73
11·1	Susteren		11 17	73
15·2	SITTARD	17	15 36	—
2·4	Lutterade		4 05	—
5·0	Beek-Elsloo		6 36	60
9·6	Bunde		11 23	60
13·4	MAASTRICHT	17	16 33	—

* Maximum speed before slack

level from Amsterdam (Amstel) to Utrecht, and No. 1135 averaged 54·3 m.p.h. over the 20·8 miles without exceeding 72 m.p.h. at any point. There is a rise of 50 ft. between Utrecht and Eindhoven, but in this distance of 50 miles there are six short but steep climbs on the approaches to the river bridges. The average between Utrecht and Eindhoven was 51·1 m.p.h., but allowing for the two p.w. slowings, the net time was 55 min., corresponding to 54·5 m.p.h.

The running over the next two short sections was much smarter, giving start to stop speeds of 56·5 and 58·5 m.p.h. respectively. The line climbs gently from Eindhoven to Sittard, the average gradients being 1 in 1,750 to Roermond, and 1 in 425 between there and Sittard. Over this last section, the average power output at the drawbar (corrected for gradient) was approximately 1,650 h.p.

The author's thanks are due to the Netherlands Railways for the facilities afforded him while in Holland.



Photo] *[P. W. B. Semmens*

Maastricht train at Amsterdam Central Station headed by a French-built Bo + Bo locomotive

Equipment for Belgian Congo Electrification—1

Distribution and overhead line systems for 50-cycle scheme between Jadotville and Tenke

IT will become a matter of historical interest that the first railway electrification in the Belgian Congo was effected on the 50-cycle, single-phase system at a time when this method of traction was still in a stage of evolution and experiment. The Jadotville-Tenke section of the Bas Congo-Katanga Railway was electrified on October 20, 1952, and the factors leading to the decision to take this step were the subject of an article in our January 9 issue this year.

Power is taken from the local hydro-electric grid through two 120 kV./25 kV. transformer substations, one of them on the premises of the Société Générale Africaine d'Electricité at Shituru, some two miles from Jadotville, and the other at Fungurume, where the 120 kV. transmission line connecting the power stations at Mwadingusha and N'Zilo crosses the railway. The choice of Shituru was made in order to take advantage of existing 120 kV. installations, and with a view to possible electrification to Elizabethville.

The line is therefore divided electrically into the three sections, Jadotville-Mulungwishi, Mulungwishi-Fungurume, and Fungurume-Tenke. Each is fed from different phases of the grid, the Shituru transformer being connected between phases 2 and 3, and the two transformers at Fungurume being across phases 1 and 3, and 1 and 2 respectively. Two neutral lengths separate the three sections of the contact line to prevent interconnection of phases by locomotive pantographs. Interlocked, mechanically-operated isolating switches are mounted on the overhead structures at each end of the neutral lengths so that they can be energised from one or other of the adjacent live sections should a locomotive be stalled on one of them.

Similar provision for isolation is made at all stations, so that if necessary the station tracks can be disconnected without interrupting the supply on the section concerned as a whole. A feeder with a cross-section of 2·3 sq. in. bridges a station when switched out.

Special protection against lightning has been provided at the substations. A network of lightning conductor cables has been erected, and high-capacity lightning conductors deal with voltage surges if the lines connected to the 120 kV. busbars are struck. These lines themselves are paralleled throughout their length by lightning conductor cables, and the pylons are earthed by a continuous double counterpoise system.

Protective Apparatus

The 25 kV. lines are protected by oil circuit-breakers. When any of these is tripped, an automatic re-set system operates. The line concerned is reconnected to the 25 kV. busbars through a 6,200-ohm resistance, and if the voltage across the resistance is of the value corresponding to a sound line, the breaker is closed automatically. Tests are made 4, 34, and 94 sec. after tripping. If the fault persists the line remains dead.

Apparatus at Shituru substation is operated from a local control panel. The Fungurume equipment can be controlled either locally or from a panel in the supervisory centre at Jadotville. Mimic diagrams with signal lamps (normally dark) are installed at all control points.

Overhead Line

The overhead system consists of a grooved copper contact wire of 1·6 sq. in. cross section suspended by droppers from a bronze catenary of 1·18 sq. in. On straight track and on curves of 3,280 yd. radius and over, as well as at stations, sectioning points, and tensioning points, the carrier and contact wires are in the same vertical plane. An inclined catenary is installed on curves sharper than 3,280 yd. radius, and for additional protection against high winds, register arms are attached to the pylons on curvature between 3,280 yd. and 547 yd. radius. There is a short experimental section of "waved" catenary on about 1¼ miles of straight track between Katsuembe and Luambo, where the overhead system describes a succession of reverse curves in the horizontal plane, with a radius of about 1,093 yd. No register arms are used on this section.

A constant tension of 2,425 lb. in the contact wire, irrespective of temperature changes, is maintained by counterpoises at intervals of between 1,093 and 1,312 yd. Although the inclined catenary is to some extent self-compensating, similar tensioning arrangements have been adopted on these sections also, because of the extremes of temperature experienced (from 0 deg. to +50 deg. C. in a single day).

With the vertical catenary the length of span is governed by the permissible axial deviation and radius of curvature.

The maximum curvature of 3,280 yd. radius on sections thus equipped has enabled a 65½ yd. span to be used throughout. Three span lengths—65½, 54½, and 43¾ yd.—were used with the inclined catenary, the shortest being suitable for the sharpest curves (219 yd. radius), which demonstrates the economy in number of supports made possible by the use of an inclined catenary on sections with severe curvature.

Anchorages for the contact wire occur at intervals of between 1,093 and 1,312 yd., and comprise tensioning equipment in a space of three spans with vertical catenary. The apparatus is of the weight and pulley type, and maintains a constant tension of 2,425 lb. on the contact wire.

Contact Line Sectioning

Near each station, and at one intermediate point between stations, the contact line is sectionalised by an air gap. The arrangement involves cable anchorages additional to those at the tensioning points, but similarly to those occurs in a space of three spans with vertical catenary. At certain points traversed at low speed the sectioning is effected by insulators in the overhead line itself, coinciding with a three-piece insulator in the carrying cable.

In vertical catenary sections the droppers near tensioning points permit sliding of the contact wire. Those in the inclined catenaries are able to assume varying angles. The vertical catenary contact wire deviates by 10 in. in each direction from the centre line of the track.

On inclined sections three axes are involved, one coincident with that of the track and the others displaced to one side or the other by 6 in. The contact wire is maintained at + or − 4 in. relative to these axes by the choice of suitable points of attachment to the supports for the suspension chains of the carrying cable.

Erection of contact wire on a straight section of track with vertical catenary

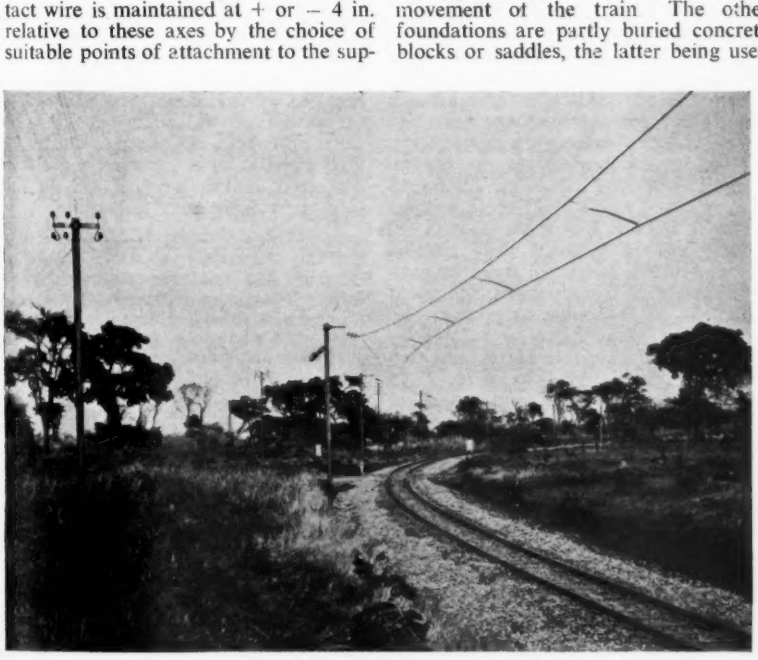
After studying various supports it was decided to use the grey type girder as this was found to be the most economical. Each support uses an average of some 7 cwt. of steel. Three types of foundations were employed. The most numerous is a cylindrical pit 6 ft. 7 in. deep and 1 ft. 9½ in. diameter, excavated by a boring machine mounted on a rail wagon. Forty per cent of the total number of foundations required were of this type. The time required for making each was 6 to 7 min., including movement of the train. The other foundations are partly buried concrete blocks or saddles, the latter being used on very difficult ground. An average of 1·4 cu. yd. of concrete is used for each block.

Boring for foundations, concrete work, and erection of pylons was carried out with the assistance of wagons specially equipped for these purposes, and progress averaged about one kilometre per day. Simultaneously a gang of workmen was engaged on digging foundations that could not be excavated by machine.

The overhead line was paid out from special wagons, one of which carried a platform extending well outside the loading gauge. As a first step the carrying cable was run over pulleys attached to the brackets as close as possible to the eventual position of the insulator groups. After the correct tension had been imparted, the cable was attached to its permanent fixings.

In the second stage the contact wire was unwound and at first attached to the carrying cable at only a few points in each span. After tensioning, the full number of droppers was put in place by men working on mobile towers at the side of the track.

(To be continued)



Inclined catenary on curved track

STEEL CASTINGS AT B.I.F.—A group of electric traction motor castings will be shown by Edgar Allen & Co. Ltd. on stand No. D.536 at the British Industries Fair. The largest will be a frame weighing a little over 15 cwt. Other castings of this type include bearing boxes, axle caps, brush holder supports, end plates, sealing rings, arm spiders and commutator hubs. The Trackwork department of the company will display manganese steel liners for axleboxes, while specimen axleboxes showing the liners in position will also be exhibited. Among other items on the stand will be small tools, permanent magnets, and special tool steels.

Locomotives for Gippsland Electrification

Mixed-traffic design of 2,400 h.p. now in course of delivery to Victorian Railways

One of the new Co-Co locomotives for the Victorian Railways in the English Electric works at Preston

THE first two of 25 main-line electric locomotives being built for the Victorian Railways reached Melbourne from England at the end of January. The remainder are being shipped at the rate of one a month for the first three months, and two a month thereafter. The locomotives, built by the English Electric Co. Ltd., have been designed for use on the Gippsland line when electrification is complete between Dandenong and Traralgon, a distance of 79 miles.

Each locomotive is 59 ft. long over coupler centres and has a wheelbase of 46 ft. 4 in. It weighs 96 tons in running order. Minimum and maximum operating heights of the pantograph from rail are 14 ft. 4 in. and 21 ft. respectively. Axle bearings are of the Timken inclined roller type. Like the diesel-electric locomotive now in service on the Victorian Railways, the electric locomotive has a driving compartment at each end. There are three doors in each compartment, one being a swing door giving swing access from outside, and the others opening into the central equipment and the front and rear end "nose" compartments respectively. These end compartments each contain a compressor and a traction motor blower which supplies air for the forced ventilation system of the three traction motors at that end. A door gives access to the compartment from outside, this being in addition to the door leading to the driver's compartment.

The central equipment compartment houses the various electrical frames, the air ventilation system, the motor-generator set, and the air equipment valves. The power circuits are supplied direct from the 1,500-V. contact wire by either of the two pantographs mounted on the roof just behind the driver's compartments. Eight notches of rheostatic braking are available, and the air braking and rheostatic braking are interlocked to provide braking alternatives.

The master controller comprises a handwheel for notching up, a reverse lever, and rheostatic braking lever. There are 36 notches on the control wheel: on notches 1 to 18 the six motors are in series; on 19 to 27 there are two parallel circuits of three motors in series; and on 28 to 36 three parallel circuits of two motors in series. In each of these three combinations, four field strengths are available to give a total of 12 running positions.

The locomotives are carried on two six-wheel bogies, each weighing 25·85 tons in running order, and having a wheel base of 14 ft. 4 in. The wheels are 40 in. in diameter. Each of the six traction motors has a weak field rating of 402 h.p. The motors are axle-hung and nose-suspended from the bogie frames. They drive the axles through resilient spur gears mounted on the axles. At each end of the locomotive, ducts convey ventilating air from the blower to the three motors it serves.

Designed for both passenger and goods working, the locomotives are in the blue and gold livery similar to that of the Victorian Railways diesel-electric locomotives, and are designated class "L." Their 1-hr. rating is 2,400 h.p. The maximum tractive effort is 47,000 lb., and, in passenger service they are capable of speeds up to 75 m.p.h. In goods service, they can haul 1,100 trailing tons up a 1 in 110 grade at 30 m.p.h.

Electrical Equipment of Line

The Gippsland line, on which these locomotives will be used, links Melbourne with Yallourn, where there are extensive deposits of good quality brown coal, large tonnages of which are brought to Melbourne for industry. The line is supplied with 1,500 V. d.c. entirely by means of pumpless steel tank mercury arc rectifiers.

From each of four main supply points, 22 kV. 3-phase transmission lines supply the traction substations. There will be 16 substations (6 double-unit and 10 single-unit), from which the d.c. will be fed to the overhead contact wire through high-speed circuit breakers. One of the advantages in the use of mercury arc rectifiers is their light weight and small size as compared with rotary converters. For example, one of the 1,500 kW. units to be used on the Gippsland line will occupy a space of about 30 sq. ft. and will weigh about 30 cwt. A rotary converter of similar capacity would take up at least 200 sq. ft. and weigh about 34 tons.

The 1,500-volt overhead contact wire system will be sectionalised at substations, and in some cases at intermediate points between substations where tie stations will be installed. There will be 12 tie stations, in which high-speed circuit breakers of the same type as used in the substations will be provided. These circuit-breakers operate at sufficiently high speed to clear the overhead circuit they feed, in the event of a fault, before appreciable damage is done.

ELECTRIC CABLES AND ACCESSORIES—British Insulated Callender's Cables Limited will show a wide range of electric cables and accessories, with particular emphasis on aluminium as a conductor and cable sheathing material, on its stand at the forthcoming British Industries Fair, Castle Bromwich. Among the exhibits will be L.T. aluminium-sheathed, and L.T. lead-sheathed cables with aluminium conductors; high-voltage cables including aluminium-sheathed, oil-filled, and aluminium sheathed I.P. cables; aluminium-sheathed conductors for overhead lines; jointing aluminium conductor cables in standard cable accessories; mass-impregnated non-draining cables; screened trailing cables, and light-weight colliery telephone cables. Other products will include bolted flame-proof couplers, industrial power capacitors, and Bicaloy electrodes for electric resistance welding.

Indian Railways—1853-1953

Background to the new phase of development initiated by Partition and the later regrouping of the systems

By F. C. Badhwar, Chairman, Indian Railway Board

The Railway Staff College at Baroda

INDIAN RAILWAYS are completing a hundred years of development, for the first passenger train ran from Bori Bunder (Bombay) to Thana, a distance of 20 miles, on April 16, 1853. This was widely acclaimed at the time as the first event of its kind not only in India but in all Asia. From this small beginning, railway construction has developed steadily, radiating inland from the principal ports and connecting most of the important centres in the country until reaching its present route-mileage of 34,120. The relative importance of railways in India is all the greater because alternative forms of inland transport have not been developed to nearly the same extent as in Western countries. This article therefore outlines the beginnings, development, and present progress of railways in India.

The success which attended the early development of railways in Great Britain showed clearly the many advantages to be derived from the new form of transport in a country of considerable distances, politically still unconsolidated, and requiring large-scale movement of troops and military stores. In addition, considerable importance was attached to the bulk movements of raw materials to the ports and to the distribution of imported goods in the hinterland.

Within twenty years of the opening of the Stockton & Darlington Railway in England, proposals were initiated by British interests for the construction of railways in India. Apprehensions regarding the prospects in a new and industrially backward country of an entirely novel form of inland transport were dispelled by the detailed studies and investigations made by a number of private and official experts, notably G. T. Clerk, J. Chapman, Colonel Kennedy, Macdonald Stephenson, and F. W. Simms.

Taking into account the difficulties common to railways in all countries in those early days and the special and peculiar obstacles, such as monsoon floods, severe storms, extremes of climate, damage by insects, and by the luxuriant tropical vegetation, and the difficulty and expense of securing the services of competent engineers and technicians, the Court of Directors of the East India Company preferred a cautious approach, and decided that the first attempts should be made on a limited scale. In accordance with this policy, contracts for the construction of short experimental lines were entered into with the East Indian Railway Company for a line from Howrah to Ranigunj (120 miles), with the Great Indian Peninsula Railway Company for a line from Bombay to Kalyan (33 miles), and with the Madras Railway Company for a line from Madras to Arkonam (39 miles).

Ambitious Construction Programme

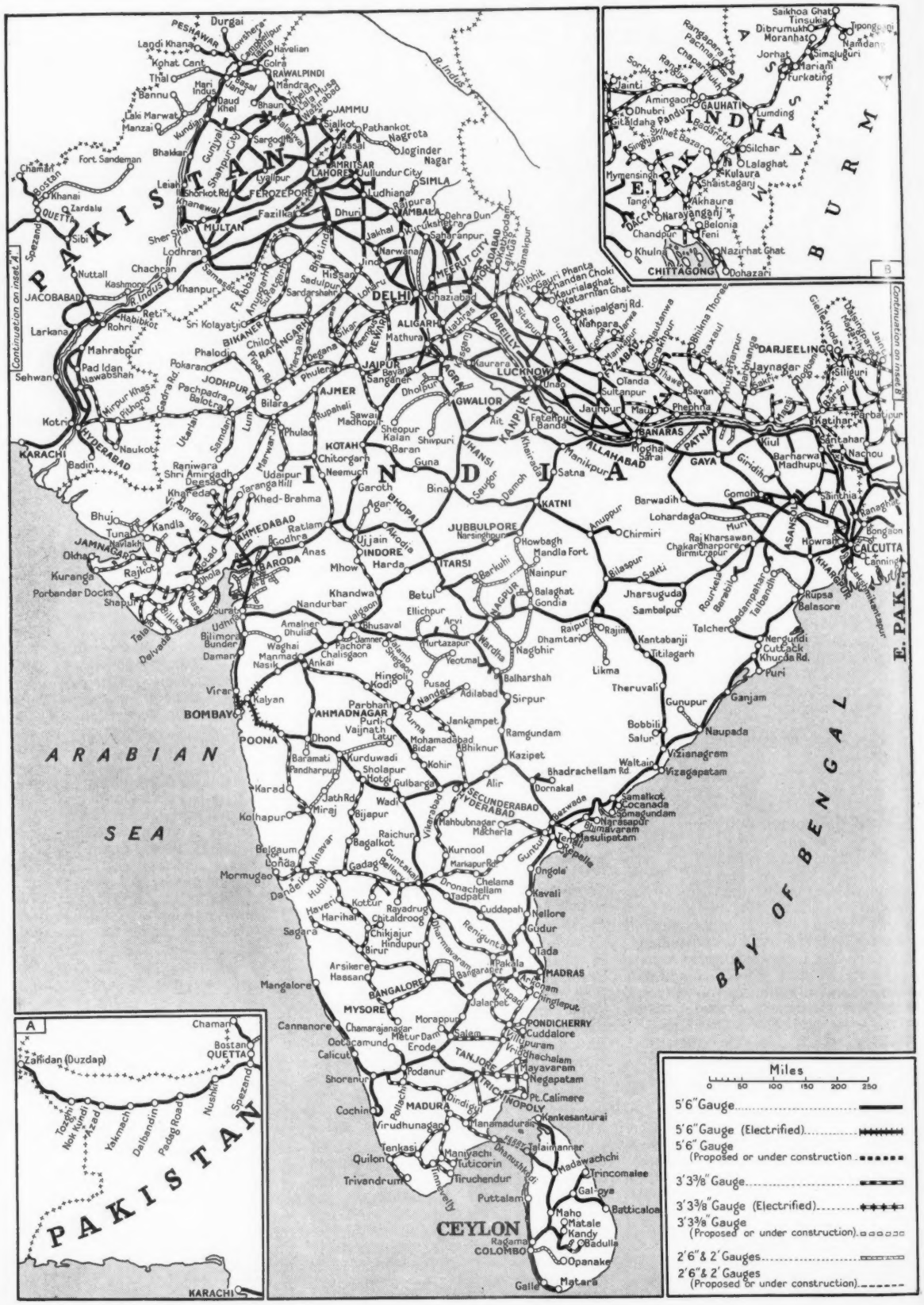
The growing success of railways in the West and the official attitude of Government indicated some advantages in planning construction on a larger scale, and Lord Dalhousie, who was then the Governor-General, urged the importance of a speedy and wide introduction of rail communications throughout India, pointing out the great social, political, and commercial advantages of constructing railways between the chief cities. He recommended, in the first instance, a system of trunk lines connecting the hinterland of the Bombay, Bengal, and Madras Presidencies with their respective principal ports and with each other. The trunk lines suggested were: (*a*) from Calcutta to Lahore; (*b*) from Bombay to North India to meet at some point the Calcutta line to Lahore; (*c*) connecting Bombay and Madras; and (*d*) from Madras to the Malabar Coast.

Although the East Indian and the Great Indian Peninsula were the two earliest railway companies to be formed, the desirability of developing railways on the lines proposed by Lord Dalhousie was accepted by the Court of Directors of the East India Company, and by the end of 1859 eight railway companies had been formed with a capital under guarantee of £52½ million sterling for the construction of nearly 5,000 miles of lines. These eight companies were: (1) the East Indian, (2) Great Indian Peninsula, (3) Madras, (4) Bombay, Baroda & Central India, (5) Eastern Bengal, (6) Indian Branch, later the Oudh & Rohilkhand, (7) Sind, Punjab & Delhi, later merged in the North Western State Railway, and (8) the Great Southern of India, later the South Indian Railway.

First Government-Company Agreements

Chief interest in railway developments during this period centres on the Government's policy towards assisting the construction of railways in India. As there were practically no resources in the country in regard to finance and technical personnel, it was taken for granted that railways should be constructed and managed through the agency of British companies. At the same time, British experience emphasised the necessity for providing safeguards against a repetition in India of the evils of unrestricted private enterprise in the railway field elsewhere. Almost from the very commencement, therefore, Government was induced to retain certain general powers of control and regulation within the limits of which the companies were allowed sufficient latitude to construct and manage their undertakings. Thus, for instance, under the arrangements originally agreed to, the Government retained the power to require a reduction in rates and fares when the net receipts exceeded 10 per cent return on the capital outlay on the lines. Also, the Government reserved the right to control and give directions to the servants of the company and to appoint a Government Director with powers of veto.

Again, interest was payable to the company at 5 per cent per annum on the capital sum paid into the Treasury. Also, the net profits of the line, after setting aside a contribution to reserves for making good the deterioration of assets, was to be applied in the first instance towards the repayment of interest to Government. It was also laid down that the mails and postal servants were to be carried free of charge. Another condition was that after 99 years, the land and works of the railways were to become the property of the Government, the rolling-stock and other movable property being paid for at a fair value. The Government also retained



The railways of India and Pakistan

the option of purchasing the lines within six months after the first 50 years. There were variations in detail in respect of different companies, but there was no decrease in subsequent years in the essential powers of Government in exercising control over these companies.

First Development Phase, 1849-1869

The first phase of railway development in India may be said to extend from 1849 to 1869, during which period the original guaranteed railway companies proceeded with the construction of the main trunk lines. Although great emphasis was laid on the advantages of entrusting railway development to the agency of private companies, the conditions which they succeeded in obtaining from Government left very little risk to the companies themselves. All the original applicants for concessions for the promotion of railways demanded that a minimum return should be guaranteed by the Government on their capital; and as companies could not then be promoted without this condition, a guarantee of 5 per cent was eventually agreed to, coupled with the free grant of all land needed for railway purposes.

In return, the companies were required to share the surplus profits half-yearly with Government, after the guaranteed interest for the half-year had been met—the rate of exchange for the remittance of interest charges being reckoned at 22d. to the rupee—and to sell the railways to the Government, after 25 years, on the basis of specified rates; they were, moreover, to permit the Government to exercise control over all expenditure and over the management and working of the lines. The guaranteed rate of interest was high and experience later showed that these conditions assisted little towards either the rapid development of the lines or in economy in the cost of their construction. These conditions might have proved beneficial to the country if the guaranteed interest had been earned, but expectations in regard to profits remained unfulfilled because of the high costs of the construction of the new lines.

High Construction Costs

The increases in these costs were attributed to a number of factors. One was that the standard of construction was far higher than required for the general conditions prevailing in the country, or for the actual functions which the railways were designed to perform. Many conveniences were provided which, though desirable in themselves, were not essential for the efficient operation of the railways. Some experimental lines were built with double track, the necessity for which did not arise till some generations later. Increases in the costs of construction were also caused by alterations in the alignments after work had actually begun. The political and military upheaval of 1857 also aggravated the position by causing suspension of all work for a time.

Consequently, earnings which might have been sufficient to pay interest charges on well-controlled and reasonable expenditure proved inadequate to meet the guarantee on the heavy outlays actually incurred, and Government had to make good the deficits. The method of sharing the profits itself also operated against the interests of the State. Even in cases where the earnings for the whole year were sufficient to cover interest charges, the operation of the clause requiring surplus profits to be divided half-yearly deprived Government of the benefits of the first half of each year, when traffic was usually much more brisk than in the latter half of the year, and sometimes resulted in a deficit on the full year's transactions.

By the end of 1859, the eight companies referred to earlier had an authorised capital of £34·13 million, of which £27·08 million were actually raised. The amount of guarantee paid by Government to the companies by January 1, 1860, amounted to £3·84 million. The earnings of the railways during this period amounted to only a little over half a million pounds. It is not possible, however, from these figures to estimate the commercial value of the lines, as out of £27·08 million raised for expenditure, only £4·09 million, representing the amount which had been expended on the 702 miles opened for traffic, could yield any return.

During the early 1860s there arose further difficulties. One was the inability of the companies themselves to raise further capital, as a result of which they had to apply for Government aid in the shape of advances. The companies to whom such advances were made were charged interest at 5 per cent, and the Government shared in the undertaking in proportion to the amount of such advances.

Rise in Value of Rupee

A further complication arose in consequence of the appreciation in value of the rupee. When the agreements were made, the rate of exchange for the rupee was 1s. 10d. and it was stipulated in all the contracts that the rupee should, in the accounts between the Government and companies, be converted into sterling at that rate. When the value of the rupee rose to 2s. the Government spent in India the equivalent of 2s. for every 1s. 10d. paid into the Government's account in England for this expenditure in India. The loss on this account during 1862-63 alone was about £2·4 million. Out of the £13·16 million paid by Government to the companies during the 14 years 1853-67 towards guaranteed interest, only £3·3 million was paid back out of the earnings of the railways. The annual charge upon the Government under this head had increased in 1865 to well above £2·70 million, taking into account both the guaranteed interest and losses by exchange operations.

This financial drain on Government made a change in the railway development policy imperative. Reviewing the first 20 years of railway development in India, Lord Lawrence, the Governor-General in 1869, wrote: "On examining the conditions under which the State is now called upon to make good a part of the guaranteed interest on Indian railway capital, it at once becomes clear that the liability of the Government to a permanent and probably increasing charge on the revenues has largely increased by the arrangement under which the Government could derive no profit whatever. . . . The whole profit goes to the companies and the whole loss to Government. It, therefore, follows almost as a positive certainty that there will be a permanent charge thrown on the Government for guaranteed interest so long as the present system continues."

He concluded by recording a very decided opinion to the effect that the direct agency of Government would be more economical than that of the railway companies and that there would almost certainly be advantages to the State financially and, therefore, to the community of India at large, if the Government were to construct railways with money directly borrowed from the market for the purpose.

Construction by Government

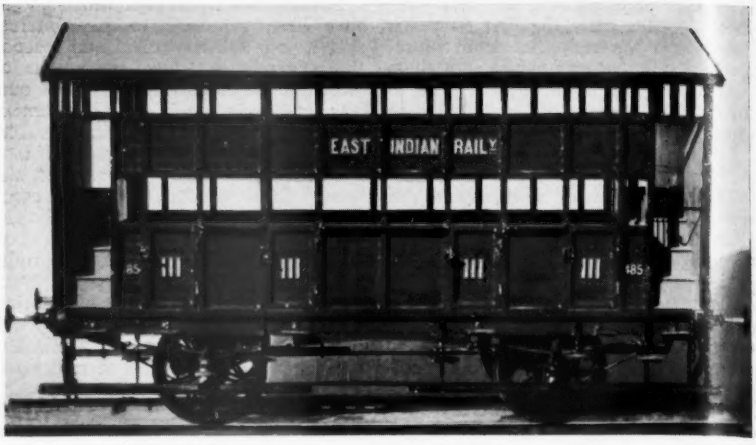
As private enterprise could not be attracted to railway projects without a guaranteed return and as its ability to raise adequate capital for such purposes also was doubtful, the State, with its superior credit in the money market, appeared the obvious agency for undertaking further developments. Further, the provision of new railway lines had failed to keep pace with the increasing requirements of the country and the new mileages opened each year had hardly averaged 350. The need for a reorientation of the railway policy was, therefore, accepted, and approval was accorded to the discontinuance of the guarantee system and to the use of State agencies instead for new constructions. The Government accordingly undertook a number of new constructions, such as the Indus Valley and the Rajputana Railways.

The original contracts with the companies were modified in order to ensure more effective control but, curiously enough, it was at the same time agreed with the companies that the Government should keep no account of outstandings in respect of guaranteed interests paid to the companies, and would cancel past debts, which there was little hope of the companies paying off in any case. It was also decided by the Secretary of State, in spite of strong protests from the Indian Government, to waive the right to purchase the Great Indian Peninsula, the Madras, and the Bombay, Baroda & Central India Railways, on the expiry of the first twenty-five years of their leases.

Introduction of Metre Gauge

The system of trunk lines proposed by Lord Dalhousie was completed by 1871, and 5,051 miles of railways, out of an approved total of 7,482 miles, had

already been opened. An important decision affecting a change in uniformity of gauge was now taken at the instance of Lord Lawrence, who considered that it was more important to extend the benefits of rail communication, even if this involved a break of gauge, than to standardise the broad gauge (5 ft. 6 in.) throughout India. The cost of construction of broad gauge lines averaged about £17,000 a mile at the time and, with the resources available to Government, the provision of new lines of this gauge could not be as rapid as of metre-gauge lines, which cost about £10,000 per mile only and would enable larger territory to be covered. It was, therefore, decided that Government should build railways on the metre gauge. Also by 1875 the allotment for railways was increased, but the Afghan war and recurring famines reduced the funds actually available for rail construction.



Double-deck third class coach of the East Indian Railway, built at Howrah workshops in 1864

New Guarantee System

The policy of State construction, however, held until 1881, after which the limited ways and means position of Government made it necessary to turn again to companies for the construction of railways under some form of guarantees. The new guarantee system, however, differed from the old one and the lines promoted under the new system were termed "State Railway lines worked by companies." The main differences between the new and the old guarantee terms were that the rate of guaranteed interest was lower and that the terms generally were easier for the Government. The new railway lines then promoted were the Indian Midland (1882-5), later merged in the G.I.P., the Bengal Nagpur (1883-7), the Southern Mahratta (1882), and the Assam Bengal (1891) Railways.

The famines of the 1870s in the province of Bihar and the Deccan peninsula stressed the need for more rapid extensions of railways and a portion of the special Famine Insurance Grant was diverted for expenditure on new lines of a productive nature. In 1883, under the advice of a Parliamentary Committee, the limit of borrowing was increased from Rs. 2 crores to Rs. 3½ crores annually, of which Rs. 3 crores were assigned wholly to railways. In 1885 some funds had to be diverted for the construction of the costly strategic and unremunerative lines on the North West Frontier, but in 1890 the whole available balance of the Famine Insurance Grant was devoted to railway building.

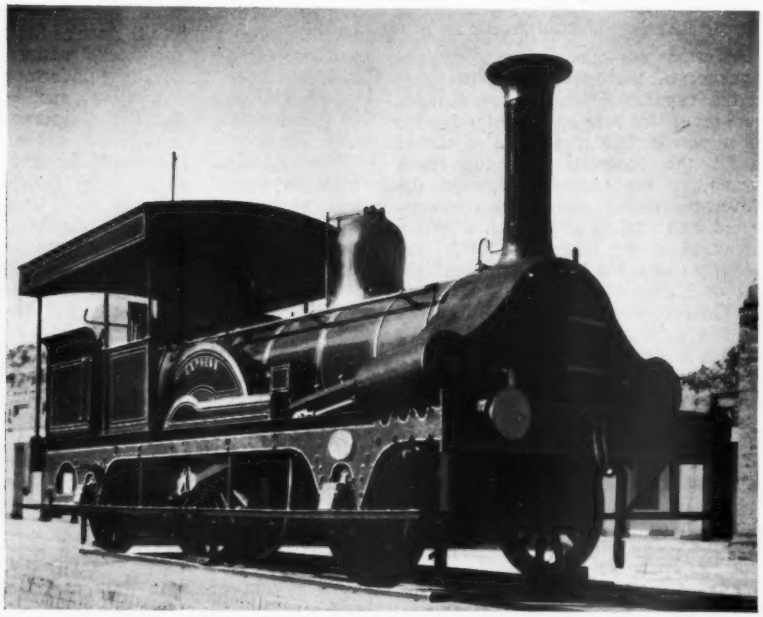
Despite the raising of the limit of capital expenditure, and of the rebate terms in 1893, progress was not considered satisfactory, and the terms for the companies were again revised in 1896, the companies now being offered either an absolute guarantee of 3 per cent., with a share of surplus profits, or a rebate up to the full extent of the main lines' net earnings to supplement their own net earnings, the total being limited to 3½ per cent on the capital outlay.

The progress of railway development during the last century is summarised briefly in Table 1, which indicates the position in terms of the route-mileage, capital outlay, gross earnings, working expenses, and net earnings.

The net losses to Government as a result of payment of guaranteed interest to the railway companies, after deducting the amounts recovered from the net receipts totalled about £51½ milion.

Formation of the Railway Board

At the turn of the century, the time was considered ripe to examine the adequacy of the existing administrative machinery for dealing with railways. In October, 1901, a Special Commissioner for Indian Railways, Sir Thomas Robertson, was appointed to inquire into and report on the general administration and working of Indian railways. As a result of his studies and recommendations, the central organisation for Government control of Indian



2-2-2 *ocomotive "Express," the first to run in passenger service on the East Indian Railway, as commemorated in the plate shown on right*

TABLE 1

MILEAGE AND RESULTS, ALL RAILWAYS, 1853-1900

Year	Route-mileage	Capital outlay	Gross earnings	Working expenses	Net earnings
		Rs. 000	Rs. 000	Rs. 000	Rs. 000
1853 ...	20	37,96	90	41	49
1860 ...	838	26,66,00	66,67	37,08	29,59
1870 ...	4,771	90,00,50	6,66,67	3,63,15	3,03,52
1880 ...	8,996	1,28,56,91	12,86,55	6,48,00	6,38,55
1890 ...	16,404	2,13,67,04	20,67,01	10,30,89	10,36,12
1900 ...	24,752	3,29,53,34	31,54,32	15,09,31	16,45,01

railways began to assume its present form.

The commencement of construction of railways by the State created the need for a separate State Railway Directorate as distinct from the Public Works Department. This Directorate was formed in 1874 and placed in succession first under one Central Director, later under three Territorial Directors with a Central Director of Railway Stores to provision them, and, after further experience, again under a central Director-General of Railways. In 1897, as the scope and responsibilities of this post increased, it was replaced by that of a full Secretary to the Government of India. Robertson had also recommended the setting up of a small board headed by a President or Chief Commissioner, with two other Commissioners of high railway standing. The Railway Board was eventually set up in 1905, and to it were transferred control of all matters pertaining to railways in India.

Developments, 1900-1914

The demand for railway expansion continued but the expenditure on new construction fell far short of popular expectations. The Government appointed the Mackay Committee in 1907 to examine the country's requirements of new railways and explore means for financing such new constructions. During this period, the annual losses on railway account had disappeared and the gain to the State from its railway investment had become a regular feature. That railways in India were a paying proposition was remarked upon by the Mackay Committee, which, commenting on the inadequacy of rail transport facilities and the urgency of large-scale constructions, expressed the views that even a total route-mileage of 100,000 " was short of that which will ultimately be found to be necessary in India," and " the steady and even rapid development of the railway system of India should be regarded by Government as one of its important duties."

It was recommended that £100 million should be spent on new construction and development in the next eight years. New railway constructions, however, continued to progress at a much more modest rate, and during the period 1900-14 only about 10,000 route-miles were added. This was substantially less than the increase in route-mileage during the preceding 15 years. The progress of new constructions was, however, fairly steady till the first world war slowed it down.

Indian railways contributed appreciably to the first world war by diverting much of their resources to meet military requirements. The transport of troops, materials, and supplies at short notice had to be arranged, and heavy demands for materials and personnel for railways in East Africa and Mesopotamia had to be met. Many sections of railway workshops were also diverted to the production of war equipment. As overseas supplies of railway materials and components from the United Kingdom, the principal supplier, were cut off, arrears of maintenance and renewals accumulated and railway assets in service were reduced to a serious state.

After the First World War

At the end of the war, the transport situation in India had become grave, and all interests concerned with agriculture, trade and industry were unanimous in demanding drastic and urgent steps to rehabilitate the Indian railway system to meet the economic requirements of the country.

At about the same time, certain important matters of future railway policy required early consideration. The contract with the East Indian Railway Company was due to expire in 1919. Public opinion had consistently declared its preference for State management, and was not satisfied with railways in India being managed by British companies with boards of directors in London. Moreover, it saw no reason why these companies should continue to obtain recruits from overseas for almost all their higher posts, believing that good material was available in the country.

Then there was the question of the industrialisation of the country and the positive contribution that railways could make towards accelerating its pace. It was held that Government management would result in more positive and earlier measures favourable towards indigenous industrial development than a continuation of company management with a natural bias towards vested interests and good dividends for shareholders. Also, procurement of railway stores afforded a valuable opportunity for encouraging domestic industry by giving it a degree of preference. It was felt that company-managed railways, with boards of directors in England, could not be expected to respond to such developmental policies, whereas State management would be more sympathetic towards economic advancement in the country.

Finally, Government would recognise more readily than the companies the need for improving conditions and amenities for third class passengers. The force of public opinion in favour of State management had gained strength and, coupled with impending constitutional changes, led to a decision to postpone any far-reaching changes until a comprehensive inquiry into all aspects of the question had been completed. Table 2 shows the results of the working of Indian Railways from 1901 to 1923-24.

Towards State Management

A committee was set up in 1920 with Sir William Acworth as Chairman, to undertake a comprehensive inquiry into questions relating to the management, finance and the future control and organisation of railways. The committee, by a majority, recommended termination of the contracts with the companies as they fell due. The financial policy of the Government of India, which made no provision for either reserves or for ensuring a steady flow of funds for financing railway construction and improvements, came in for severe criticism, and the committee recommended the separation of the Railway Budget from the General Budget of the country. The need for making adequate provision for depreciation and limiting the demands of the State on railway surpluses was also emphasised. On a number of other matters of topical interest, such as Indianisation of the higher cadres, stores purchases, and rating policy, the recommendations of the committee were generally in conformity with the public demand.

The Ackworth Committee's recommendations were accepted by the Government, and by a resolution passed on September 20, 1924, railway finance was separated from the general finance of the country. The Railway Board was reorganised, with a Chief Commissioner and a Financial Commissioner, besides technical Members. The technical Directorates were also reinforced and expanded. As regards the policy of State management, the Government was already operating three railway systems, namely, the

TABLE 2

Year	Route mileage	Capital outlay	Gross earnings	Working expenses	Net earnings
		Rs. 000	Rs. 000	Rs. 000	Rs. 000
1901 ...	25,332	3,39,16,89	33,60,38	15,72,45	17,87,93
1910 ...	32,099	4,39,04,73	51,14,22	27,15,72	23,98,50
1919-20 ...	36,735	5,66,37,77	89,15,32	50,65,65	38,49,67
1923-24 ...	38,039	7,17,93,02	1,07,79,66	68,44,77	39,34,89

North Western, the Oudh & Rohilkhand, and the Eastern Bengal Railways, and on January 1, 1925, the East Indian Railway was taken over by the State and merged with the Oudh & Rohilkhand Railway. On May 1, 1925, the contract with the Great Indian Peninsula Railway Company expired and this line was also taken under State management. In 1929, the Burma Railways were taken over by the State and thus five major systems were operated under direct State management by 1929-30.

Indian Railways, 1924-37

The first six years after the adoption of the Convention instituting a separate budget for railways witnessed the introduction of a series of other far-reaching changes in finance and organisation. A proper depreciation fund was set up. The accounting machinery was examined by Sir Arthur Lowes Dickinson and a beginning made towards the separation of the accounts from the audit. The administrative set-ups of individual railways were also overhauled and with a view to decentralisation in the case of the larger systems, particularly the North Western and the East Indian, the divisional system of organisation was introduced. A more progressive policy designed to improve the conditions of railway labour was also adopted. Systematic programmes of open line improvements and new construction were drawn up and a substantial addition was made to the route-mileage. The capacity of some intensively-worked lines was increased by doubling and quadrupling.

The programme of rehabilitation and modernisation included improvement of the permanent way, strengthening of bridges, remodelling of yards, new station buildings, and more staff quarters. Several workshops were extended and better equipped. The electrification of suburban services in the Bombay and Madras areas was undertaken during this period. The total capital outlay incurred on all these items during the period 1924-32 was the equivalent of about £90 million. The construction of new lines alone amounted to an addition of 5,360 route-miles at a capital expenditure of about £30 million, figures which would have been greatly exceeded but for the world slump of the early 1930s.

Expansion and Prosperity

Railway revenues were also high and after meeting operating expenses and appropriation to depreciation fund, a handsome surplus was left to meet the contribution to the general revenues of Government and to build up a reserve fund. The financial results of Indian State-owned railways during 1924-30 are summarised in Table 3.

World Slump

The years of prosperity came to an unexpected and abrupt end with the world-wide slump in 1929-31 when construction programmes were suddenly and severely curtailed. Railway receipts, following the general depression in agriculture, industry, and trade, dropped steeply and retrenchment of staff had to be enforced to keep down further losses. The accumulations in the reserve fund were almost wiped out within a year or two, and the depreciation fund had to be raided to the extent of about £23 million in order to meet the interest charges on capital, after the suspension of contributions to general revenues.

TABLE 3
FINANCIAL RESULTS OF INDIAN STATE-OWNED RAILWAYS, 1924-30

—	1924-30 (average) (in lakhs of Rs.)
Gross traffic receipts	1,01,22
Operating expenses	53,40
Depreciation fund	11,31
Net traffic receipts	36,51
Net miscellaneous receipts	80
Net revenue	35,71
Interest charges	26,94
Surplus	8,77
Contribution to general revenues ...	5,98
Railway Reserve Fund	2,79

It was only in 1937-38 that the situation improved slightly. The financial position of Indian railways during the depression is shown in Table 4.

On April 1, 1937, Burma was separated from India and the Burma railways also parted company from the Indian railway system.

Second World War

It required the traffic demands of the second world war to bring prosperity back to Indian railways. Increased earnings began from 1939-40, resulting in surpluses which more than made up for the loans previously taken from the depreciation fund to meet deficits in the thirties and pay off the contributions then suspended. The war was more protracted than its predecessor and inflicted far greater wear and tear on railways.

TABLE 4
FINANCIAL RESULTS OF INDIAN STATE-OWNED RAILWAYS, 1930-37

—	1930-37 (average) (in lakhs of Rs.)
Gross traffic receipts	89,88
Operating expenses	50,52
Depreciation fund	13,43
Net traffic receipts	25,93
Net miscellaneous receipts	48
Net revenue	26,41
Interest charges	32,18
Surplus	−5,77
Contribution to general revenues ...	82
Railway Reserve Fund	−2,27

Attrition of assets due to intensive use and postponement of renewals, and even of essential maintenance, in many cases due to lack of resources, left Indian railways by 1945 in an even more serious state than they had been in 1918. When they emerged from the depression in 1937, the railways faced the problem of overtaking the arrears of maintenance and replacements since 1931. But the outbreak of the Second World War in 1939 interrupted this process, as overseas sources of supply diverted their production to meet the exigencies of the war and mobilised all their resources for war efforts.

During the first phase of the war, Indian railways were called upon, despite their accumulated deficiencies and difficulties, to release locomotives, wagons, and track material for the Middle East, the defence responsibility of which had been allotted to the Indian Command. Over 8 per cent of metre-gauge locomotives and 15 per cent of metre-gauge wagons of Indian railways as well as 4,000 miles of track and 4 million sleepers were released for use for military purposes. This necessitated the dismantling of 26 branch lines as well as curtailment of services on many others.

Later, India became the base for mounting a major offensive against Japan and the load on railways increased still further. A large number of railway workshops were diverted to the manufacture of munitions while the maintenance and renewal of railway equipment received little attention. The continuous strain imposed on Indian railways by demands for heavy military movements brought them almost to breaking point. Enormous arrears of renewals and replacements accumulated and indigenous facilities for rehabilitation were appreciably reduced, or incapacitated, by the mobilisation of workshop equipment for the war effort.

When hostilities ceased, the railways were faced with major problems not susceptible of immediate solution. Plans for postwar rehabilitation and development were necessarily long-term, but most of these were stultified by the effects of the partition of the country which necessitated the dismemberment of the North Western and the Bengal Assam Railways. In addition to the problems of reconstituting the Indian parts of these systems into self-sufficient units, and complicated staff changes, there were the formidable difficulties caused by the mass movements of persons who had been displaced from each Dominion.

Postwar Developments

One redeeming feature of the war on Indian railways was that both the depreciation and the reserve funds were well stocked to meet future expenditure, as little could be purchased during the war. Another important factor was that during the war period the remaining company-managed railways, about the taking over of which by the State there had been considerable controversy during the thirties, had been brought under State management. The acquisition of these British companies' lines afforded an opportunity to use some of the rapidly accumulating sterling balances to good purpose, and the Assam Bengal, Oudh & Tirhut, Bombay, Baroda & Central India, Madras & Southern Mahratta, Bengal Nagpur, and South Indian Railways were all acquired and transferred to State management during the war years.

In dealing with the problems of large-scale rehabilitation it has been neces-

sary to keep in view the enormous increases in the volume of traffic, shown in Table 5.

The volume of passenger traffic had increased more than two and a half times, and goods traffic had also gone up substantially. On the other hand a large number of locomotives, coaching vehicles and wagons was over-age and obsolete, and the track had deteriorated to dangerous levels demanding severe speed restrictions. All these defects had their inevitable repercussions on the general efficiency of the transport system, by restricting capacity, slowing down the movement of trains, and making the imposition of priorities essential.

Partition had also affected the pattern of traffic, and the loss of the Port of Karachi added to the burden on the Bombay-Delhi route, necessitating augmentation of line capacity, increase of yard capacity and facilities, and readjustment of many other essential operating arrangements. The shock of Partition had, however, mostly been absorbed by the middle of 1948, but the other factors continued to strain the transport system of the country to the utmost and created several grave bottlenecks.

TABLE 5
VOLUME OF TRAFFIC HANDLED

—	1938-39 (millions)	1949-50 (millions)
Passengers carried	372	1,081
Freight tons carried ...	86	105
Passenger-miles	12,589	32,844
Freight ton-miles	17,047	23,144

The power position called for urgent attention and was tackled first. As a result of special steps, large orders were placed with early delivery dates for locomotives, and the timely arrival of these brought about a noticeable improvement. Simultaneously it was decided to set up in the country a modern locomotive manufacturing industry for Indian Railways and the new factory at Chittaranjan was completed within two years and has already produced its first 50 engines. It is designed for an output of 120 engines per annum, plus spare boilers and other components. The Tata Engineering & Locomotive Company, a private company in which Government has shares, is also producing boilers and locomotives.

The shortage of coaching vehicles has been the principal obstacle in affording relief to overcrowding in passenger trains. Some progress in providing additional carriages has already been made by railway workshops, and the resources of the Hindustan Aircraft Factory at Bangalore have also been partially utilised for the purpose of producing more coaching vehicles. Substantial improvement is expected when the new coach-building factory now under construction at Perambur, near Madras, is completed.

Reorganisation Since 1947

During the five years since Independence, several far-reaching changes in railway organisation and policy have been carried out. A new system of rates and fares, planned on comprehensive lines, was brought into force in 1948. Passenger fares, which used to vary in the past from railway to railway, were standardised throughout the country. The revision of the freight rates system was more difficult, but the necessity for rating reforms had been recognised for some time. A post-war Rating Committee had been set up to undertake a detailed examination of existing rates and make recommendations regarding the changes to be introduced. The revised system, which incorporated many of these recommendations, came into force with effect from October 1, 1948.

The four main features of the new system are: first, the highly individualistic character of some rates was radically modified and a telescopic bias was imparted to class rates, a reform long pressed for by the commercial community; secondly, the difference between the rates on railway risk and owner's risk conditions was rather wide under

A "WP" 4-6-2 locomotive on an express leaving Howrah Terminus, Calcutta

the previous classification and was now narrowed down to about the difference between two successive classes; thirdly, the large number of special rates was considerably reduced; and, fourthly, the terminal charges were standardised throughout the country.

The overhaul of the machinery for the adjudication of rates disputes was also effected at the same time. The former Rates Advisory Committee had not been empowered to enforce its decisions on railway administrations. Its intervention in rates matters was not, therefore, invoked as frequently as it might have been by the trading community due to this limitation. In 1948 the Indian Railways Act was suitably amended and provision was made for the setting up of a Railway Rates Tribunal with mandatory powers.

It was logical that the political independence of the country should create an urge for self-sufficiency on the part of Indian Railways in the technical field. After a careful assessment of the talent available, it was decided in 1949 to form Design and Consultant Wings from the Engineering cadres of railways in India to replace the well-known firms of British Consulting Engineers, who had provided technical guidance for the past three-quarters of a century. Indian Railways were fortunate in possessing civil and mechanical engineers of high calibre with aptitude and some experience in this line of work, with the result that well-organised locomotive, carriage and wagon, and structural and permanent-way design and consultant wings, manned entirely by Indians, are now functioning with complete satisfaction.

Revision of the Convention

Another important change was the revision in 1949 of the Convention separating the Railway Finance from General Finance. The original Convention of 1924 was intended to be reviewed after three years, but this review had been postponed for various reasons. The only change brought about during the 25 years since its adoption was the amendment, in 1943, of one of the clauses relating to the determination of the contribution under which Government was empowered to fix the contribution from year to year from 1944-5 onwards. There were some other features of the old Convention which had become out of step with post-war conditions and the present-day requirements of the country. A committee of Parliament was accordingly set up to go into the entire question and its recommendations were generally accepted.

According to the Revised Convention of 1949, the general taxpayer was accorded the status of the sole shareholder in the railway undertaking with a guaranteed dividend of 4 per cent on the loan capital invested as computed annually. The contribution to the depreciation reserve fund was raised to a minimum of Rs. 15 crores a year to enable increased appropriations being made to allow for the high costs of replacement at post-war levels of prices. The financial limit for charging to revenue the cost of minor additions and improvements was raised from Rs. 10,000 to Rs. 25,000 for each individual item.

A special provision was also made to cover expenditure on unremunerative projects for improving operational efficiency in excess of Rs. 3 lakhs, such costs being charged to a railway development fund intended to finance passenger amenities, staff welfare works, and projects which were necessary but financially unremunerative at the time of construction. Finally, the scope of the reserve fund was limited to securing payment of prescribed dividends and to bridging the budgetary gap, should any occur during the currency of the Convention. The Convention was to operate for a period of five years. The Revised Convention is obviously an advance on the original Convention and provides deterrents to any tendency towards overcapitalisation.

Regrouping of Railways

The regrouping of Indian Railways on a rational and geographical basis, which has been the subject of consideration for nearly a quarter of a century, had by 1949 reached a stage where it could no longer be postponed. The cutting up of the North Western Railway and the Bengal Assam Railway as a result of the Partition of the country had left certain sections within India which were, relatively, too small and poorly equipped with workshops and other resources for economical working.

Also the federal financial integration of the Indian States had just been completed and by April 1, 1950, the railways belonging to these States, varying from the four route-miles of the Sangli State to the 1,400 miles of Hyderabad State, had become parts of the Indian Government Railway system. The reorganisation of all these lines to form a smaller number of larger and more resourceful systems was imperative in the interests of standards of working, uniformity in operational arrangements and procedures, extension of facilities and reasonable amenities for the travelling and trading public.

As a result of detailed and expert consideration of the question, the Railway Board finalised a scheme for dividing the now-integrated Indian Railways system into six administrative and operating zones. Public opinion was sounded on these proposals and some details were revised as the result of such references. Finally the revised scheme was placed before the Central Advisory Council for Railways, a parliamentary body, which accorded its approval. The first regrouped railway to be formed was the Southern Railway on April 14, 1951. This was made up of the former Madras & Southern Mahratta, the South Indian, and the Mysore State Railways, with its headquarters at Madras. On November 5, 1951, the Central and the Western Railways were formed, with separate headquarters but both located at Bombay. The former absorbed the Hyderabad State, Dholpur, and Scindia State Railways into the Great Indian Peninsula Railway, and the latter the Saurashtra, Jaipur, Rajasthan, and Cutch State Railways into the Bombay, Baroda & Central India Railway.

The final phase of the programme of regrouping was completed on April 14, 1952, when the Northern, North-Eastern, and Eastern Railways were formed. The Northern Railway represented the fusion of the Eastern Punjab, the Bikaner and the Jodhpur Railways with the Allahabad, Lucknow, and Moradabad Divisions of the East Indian Railway, with headquarters at Delhi. The North Eastern Railway was a case of simple amalgamation of the Oudh Tirhut and the Assam Railways, with headquarters at Gorakhpur. The remaining divisions of the East Indian Railway were combined with the Bengal Nagpur Railway to form the Eastern Railway with headquarters at Calcutta. The extent of the regrouped railways may be seen from the following Table.

TABLE 6
ROUTE MILEAGE, RE-GROUPED RAILWAYS

Railway	Route mileage
Southern	6,017
Central	5,428
Western	5,631
Northern	6,007
North Eastern	4,787
Eastern	5,667

The executive and administrative organisation of the constituent units of the regrouped railways has been left largely undisturbed. In the case of the railways based on the district pattern of organisation—the Southern, Western, and North Eastern—three regional headquarters have been set up in each zone under the control of Regional Deputy Heads of Departments for intermediate co-ordination and supervision. On the other railways the constituent units have been moulded to the predominating Divisional pattern. Only on the Eastern Railway is there a mixture, the old East Indian divisions being retained as such along with the District organisation of the Bengal Nagpur Railway controlled through a region at Bilaspur. This policy has had the advantage of avoiding any dislocation in the actual working.

Rehabilitation and Expansion

Indian Railways have had to plan their programmes of rehabilitation, improvements and new construction within limitations of finance and indigenous resources. New constructions have been few in comparison with the many demands in the country and during recent years the Assam rail link and the connection from Deesa to the new port of Kandla, each about 180 miles in length but traversing widely differing country, have been the only new lines that could be undertaken. Rehabilitation of major assets and the improvements necessary

to obtain optimum performance from existing resources have been given the highest priorities in capital programmes. Most of the lines dismantled during the war are being restored, however, and many new constructions are being considered to provide the additional carrying capacity that the Five-Year National Development Plan demands.

Major projects selected for construction during the next three years include a rail-road bridge across the Ganga (Ganges) in Bihar, expected to consist of nine spans of 600 ft. each; new lines and doublings for expansions in the steel, coal and cement industries; a 200-mile connection between the Northern and Southern metre-gauge systems; electrification of certain steam-traction sections; many works to increase line capacity of intensively worked lengths; and new railway factories for producing in India a number of railway components that are still imported. The rate of progress on these projects must necessarily depend upon the resources made available from year to year.

It can legitimately be claimed that Indian Railways present on the whole a progressive and commendable record. Their close association with the State has not impaired the observance of commercial principles of working which are so necessary to maintain efficiency, while the public utility aspect of their functions has been steadily kept to the fore. The efforts made in recent years to improve the standards of amenities and comfort for third class passengers deserve special mention. Financially, also, the position of Indian Railways has remained essentially sound, and the large balances accumulated in their reserve funds have been of substantial help to the country. On March 31, 1953, the balances at the credit of the depreciation reserve fund, revenue reserve fund, and development fund had been estimated at £90 million, £30 million and £20 million respectively, totalling £140 million. The financial results for 1951-52 are summarised in Table 7.

TABLE 7
FINANCIAL RESULTS OF INDIAN GOVERNMENT RAILWAYS

—	1951-52 (lakhs of Rs.)
Gross traffic receipts	2,90,82
Ordinary working expenses	1,94,04
Appropriation to depreciation fund ...	30,00
Payment to worked lines	31
Net traffic receipts	66,47
Net miscellaneous receipts	—4,72
Net revenue	61,75
Dividend to general revenues	33,41
Development fund	10,00
Revenue reserve fund	18,34

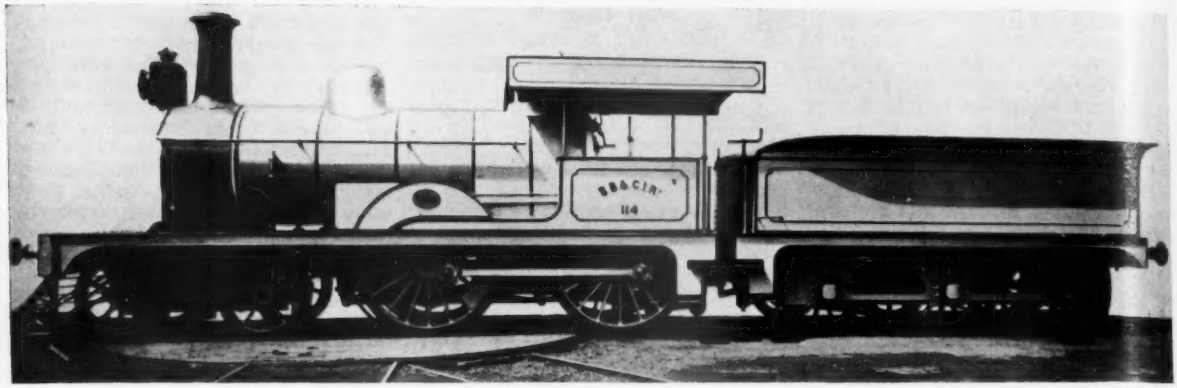
With so heartening a record during the past hundred years, Indian Railways will enter their second century of public service with every confidence and hope. The fortitude and success with which they have faced the many formidable difficulties of two wars and the partition of the country, when they were far less self-sufficient than at present, augurs well for their ability to deal with future emergencies and to provide India with a transport basis on which her future prosperity can be built.

Interior of modern, broad gauge dining car

KHANDWA - HINGOLI LINK.—In his budget speech, summarised in our March 13 issue, the Indian Minister for Railways announced the intention to begin construction of the long-projected link between Khandwa and Hingoli which will unite the northern and southern metre-gauge systems. Khandwa is the southern terminus of the metre-gauge line from Ajmer through Ratlam and Indore, and a station on the Bombay - Jubbulpore broad-gauge main line. Hingoli, 186 miles to the south, is the terminus of a branch from Purna, on the metre-gauge line of the former Nizam's State Railway from Secunderabad to Manmad. The proposed link will cross the Bhusadal - Nagpur broad-gauge line. Not only will the new line obviate transhipment but it will also allow the free interchange of stock between the two metre-gauge networks.

Indian Locomotive Development and Practice

The contribution of British manufacturers throughout a century



Bombay, Baroda & Central India Railway " O " class locomotive of 1882, *built by the Vulcan Foundry Limited*

IT might be said that Indian locomotive history has gone through three periods: first, that in which, apart from a few special ghat engines, locomotives were to normal British types with the fewest modifications; secondly, that in which Indian designs were being evolved, though still based on British practice; and finally, the stage in which Indian designs for Indian conditions were followed for the majority of new construction. With equal truth one might divide the century into non-standardisation and standardisation periods, though here, as in the three periods, there is overlapping, for as far as standardisation was technically possible in the mid-Victorian age it was adopted in India to the full extent.

From 1853 until the end of the nineteenth century the great majority of locomotive construction was so much along normal lines that an article of this length can deal only with salient factors, and these are few in number. First, there was the attempt by railways such as the East Indian to standardise the principal dimensions of its hundreds of 2-4-0 engines built by several British makers down to about 1880, and, coincidentally, to standardise the boiler dimensions and heating surfaces of the various 2-4-0 and 2-2-2 classes. Shop equipment and practice at that time did not permit strict interchangeability of boilers.

The second of the outstanding aspects was the evolution of special types for the ghat, or hill, sections, principally on the Great Indian Peninsula Railway, where the short uncompleted sections on the Bhore Ghat (Poona line) and Thull Ghat (Bhusaval line) were interfering seriously with transport between Bombay and the central part of the country. The first hill sections completed had been worked by diminutive four-coupled tank engines coupled back to back, a practice followed in the same period in other countries, for example, the Giovi incline in Italy. Berkeley, on the G.I.P., evolved a 53-ton 4-6-0 saddle tank for the ghats, and a few of these were built by Sharp Stewart in 1862, but they were not successful, and in 1865, when both Bhore and Thull Ghats were open throughout an 0-8-0 tank design was substituted, and built first by Kitson. Contrary to the six-coupled locomotives, it was so successful that over 80 were built during the ensuing 25 years by a number of British builders.

Early Metre-Gauge Types

Third of the principal factors influencing Indian locomotive design was the adoption of the metre-gauge, first in a small way in 1868-70 and then on a rapidly-increasing scale as soon as it was found that the narrow gauge need not be applied solely to short feeder lines. In 1880-81 standard locomotive types were introduced, and comprised mainly the " O " class 4-4-0 passenger engine and the " F " class 0-6-0 freight type, both with outside cylinders and outside frames. Of outstanding success in their general performance, they were built over a period of many years, and, like the broad-gauge engines, the great majority were constructed in British works. Indeed, in the 100 years of Indian railways, the British locomotive manufacturing industry has constructed over 90 per cent of all the locomotives; a like proportion applies also on the many small narrow-gauge light railways not yet incorporated in the present Indian Government Railways.

In the course of this construction certain individual builders have achieved some extraordinary figures. Vulcan Foundry, for example, which in 1852 built the first eight locomotives for the G.I.P.. the first railway to be opened in India, has delivered an average of one locomotive a fortnight throughout the whole hundred years. The North British Locomotive Co. Ltd. and its three predecessors—Sharp Stewart, Neilson, and Dübs—have delivered an average of six locomotives a month over the 95 years from 1858.

At the same time as the metre-gauge system was developing, the broad-gauge railways, though extending rapidly in mileage, were being operated by ordinary 2-2-2, 2-4-0 and, later, 4-4-0 and 0-6-0 classes. In 1880 a step forward was made with the introduction of the 4-6-0 wheel arrangement; the first locomotives of this type were built by Neilson for the Indian State Railway, with 18-in. × 26-in. cylinders and 50-in. driving wheels. In 1885 Dübs built similar locomotives but with 51in. driving wheels, and this very successful class eventually numbered 275 engines, some of which had an exceedingly long life.

Within a few years the 4-6-0 had been developed into a broad-gauge express engine, supplemented on the more level lines by 4-4-2 engines. Coincident with this work attempts were made at compounding with Sandford's experiments of 1883-84, and ten Webb 2-4-0s built in the same years by Dübs, followed by a two-cylinder 4-6-0 compound supplied to the Bengal-Nagpur by Neilson. Further types were supplied in the next few years by these builders and by Sharp Stewart. These had no effect on Indian locomotive practice, except on the Bengal-Nagpur, where the experiments led to the long line of handsome and successful four-cylinder 4-4-2 and 4-6-2 express engines built down to 1928.

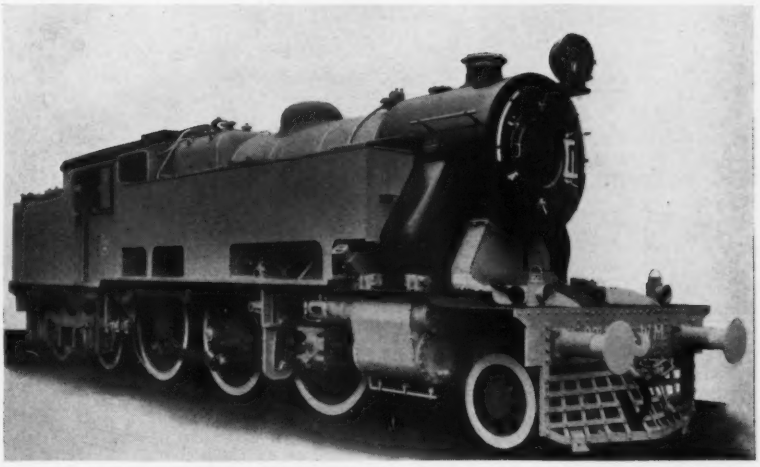
Perhaps the most vital step in the whole of Indian locomotive history came just after the turn of the twentieth century when Robert Stephenson & Company, working in collaboration with the railway's consulting engineer, Sir John Wolfe Barry, evolved a 2-8-0 heavy freight engine representing a considerable increase in capacity over the biggest 0-6-0 engines then handling the

main freight trains. These Consolidations gave such performance on 1,200-ton coal trains that their design was adopted as the heavy freight standard by the Engineering Standards Committee for use on the various State lines, though with modifications to valve gear and drive, and, from 1907, with the application of the Schmidt superheater.

First Standard Designs

The Standards Committee had already been busy on the preparation of standard designs at the request of the Secretary of State, and in its report of 1903 had recommended 4-4-0 and 0-6-0 types. The success of this B.N.R. 2-8-0 gave a fillip to the whole locomotive standardisation procedure, and by 1907 standard designs for broad-gauge 4-4-0, 0-6-0, 4-4-2, 4-6-0, 2-8-0, and 2-6-4T types were in being and orders placed with, or completed by, British makers. At the same time standard designs for the metre-gauge motive power were drawn up, beginning in 1903, and comprised first a 4-8-0 freight type and 4-6-0 passenger and mixed-traffic designs. In 1910 a 2-6-2T design was added.

All these designs, with gradual modifications and enlargements, were built for twenty years or more, and formed the backbone of Indian motive power through a difficult era of increasing traffic which included the first world war years. Within the construction period of these B.E.S.A. standard locomotives, only a few special or non-standard types were built, though variation in minor details, such as the cab shape, was allowed. The Bengal-Nagpur, with its compounds, was the most notable of the exceptions, but the G.I.P. had large 2-6-2T suburban and 0-8-4T banking engines; and, in 1919-20, the North British Locomotive Co. Ltd. delivered one of the most striking designs in a hundred years—the four-cylinder simple 2-10-0 engines designed to haul, with the aid of one banker, 1,500-ton trains over the 1 in 37 grades of the Western Ghats.

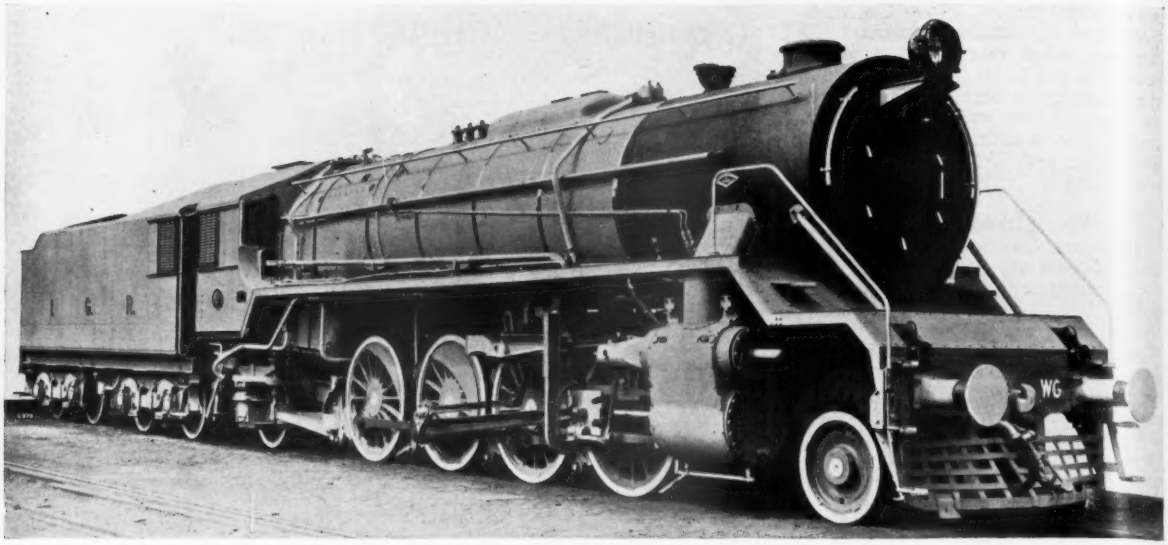


One of the latest designs of "WM" class standard tank locomotives built by the Vulcan Foundry Limited

In the middle 1920s an entirely new set of standard steam locomotive designs was begun. A feature of the types produced was a large grate area to enable low-grade Indian coal to be burned. These locomotives covered almost every type of working on broad and metre gauges. When the first contract for 73 broad-gauge engines was given to the Vulcan Foundry the builder had to work out the whole detail design in collaboration with Messrs. Rendel, Palmer & Tritton, the consulting engineers. The "X" classes for 5-ft. 6-in. gauge lines comprised "XA," "XB," "XC" Pacifics with increasing axle loads, "XD" and "XE" 2-8-2 freight engines, and "XF" and "XG" 0-8-0 locomotives built by Beyer Peacock, the latter class being subsequently converted to 2-8-2. For the metre gauge two types of 4-6-2 ("YB" and "YC") and one 2-8-2 ("YD") were evolved. The first contract for these was given to Nasmyth Wilson, but, as with the broad-gauge classes, succeeding contracts were shared among a number of British builders.

A few years later these standards were supplemented by others, those on the broad-gauge being tank engine classes of 0-4-2T, 0-6-2T, 2-6-2T, and 2-6-4T wheel arrangements. Standards for 2-ft. 6-in. gauge lines were introduced,

A 2-10-0 locomotive for heavy goods service over the Western ghats on the Great Indian Peninsula Railway, built by the North British Locomotive Co. Ltd. in 1920



"WG" class standard main-line heavy goods locomotive built by the North British Locomotive Co. Ltd. in 1951

principally of 2-6-2 and 2-8-2 forms. Almost from the first batch of "X"-class broad-gauge standards being built, variations had been constructed, first with four four-cylinder poppet valve gear 4-6-2 engines; and, in 1937, with the "XP" class, developed from the old "XC" in the endeavour to produce an engine which would run 200,000 miles between heavy overhauls.

This period also saw the introduction and extension of the Beyer-Garratt on the Bengal-Nagpur Railway. Beginning with two trial engines in 1926, three further classes of 4-8-0 + 0-8-4 and 4-8-2 + 2-8-4 types weighing 204 to 234 tons (the latter still the most powerful engines operated in India), and totalling 30 engines, were set to work on the heavy coal trains in the Tatanagar industrial area.

During the last war, Beyer, Peacock & Co. Ltd. built a large number of metre-gauge Beyer-Garratt locomotives for the Assam Bengal Railway for use on the 1 in 37 grade Hill Section. These consisted of a standard type and two other types, all eight coupled but with different wheel arrangements. Since these engines were delivered a further number of the standard type but with increased axleload and modernised have been supplied to the Indian State Railways.

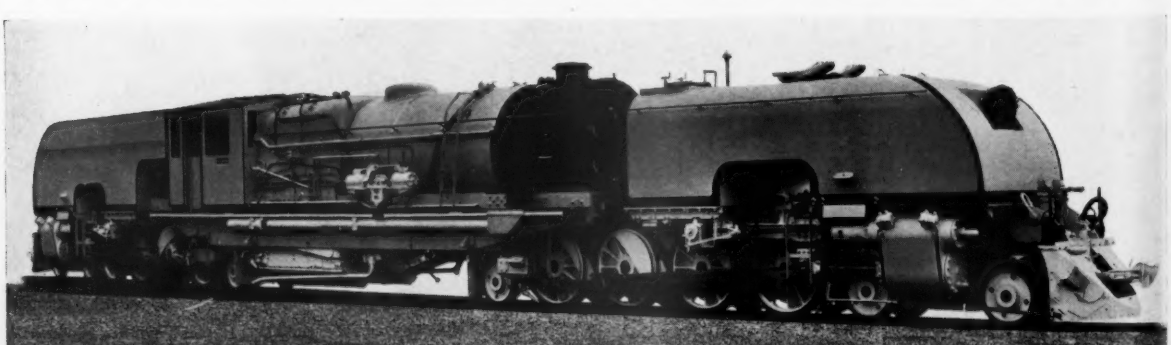
Postwar Standards

On the formation of the Indian Government Railways after the 1939-45 war, another range of standard designs was evolved largely to obtain power equivalent to that of the "X" and "Y" standards on a lower axleload, for it became a cardinal point in I.G.R. policy to obviate increase in rail weight and bridge strengthening. The existing wartime "WP" Pacific was taken as the express passenger standard. For freight work the "WG" class 2-8-2 was designed, and 100 delivered by the North British Locomotive Co. Ltd. An improved version of the "WM" class 2-6-4T has been retained in the construction list; 30 have been shipped from Vulcan and another 30 are under construction by Robert Stephenson & Hawthorns Limited. An entirely new design of "WL" class 4-6-2 locomotive is also on order with Vulcan Foundry Limited, which will shortly be building ten of this new class.

For the metre-gauge main lines a "YP" class 4-6-2 was designed, and North British is also responsible for the construction of 100 of these. Like the "WG" class broad-gauge engines the "YP" locomotives have bar frames. A new metre-gauge class now being built by Robert Stephenson & Hawthorns is the "YL" 2-6-2, characterised by an axleload of eight tons.

Electric traction on a serious scale began in India with the conversion of the Ghat lines to 1,500 V. d.c. in 1925-29. The various passenger locomotives and one freight class built in England for that conversion are now about to be supplemented by seven 3,600-h.p. double-bogie locomotives built by the English Electric Co. Ltd. and Vulcan Foundry Limited.

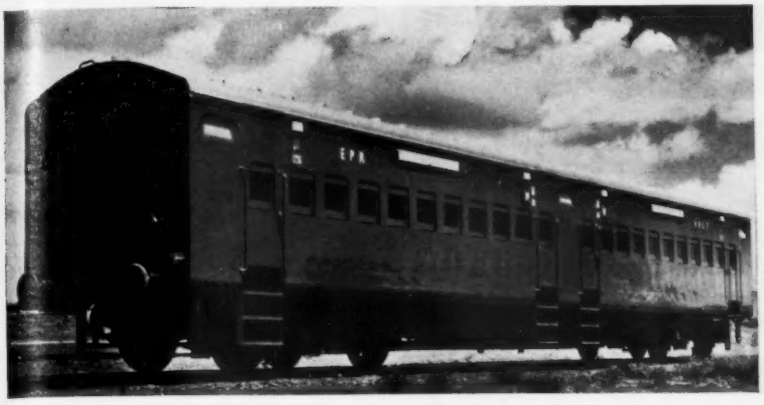
For many years locomotive building has been carried on in India on a restricted scale, notably at Ajmer (B.B.C.I.R.) for metre-gauge locomotives, and at Moghalpura on what is now the North Western Railway of Pakistan. Since the war, the British industry has provided substantial quantities of components and also technical assistance to the new Indian Government locomotive works at Chittaranjan.



Standard light type metre-gauge 4-8-2 + 2-8-4 *Beyer-Garratt locomotive with increased axleload now in service in Assam on the Mariani-Lumding-Pandu section*

Rolling Stock Design in India

Transition in recent years to construction of lightweight stock



New all-metal lightweight third class coach

THE present-day design of rolling stock on Indian Railways bears little resemblance to that of the 19th century. Particularly does this apply to interior decoration which was then more ornate and for which teak and rosewood, indigenous to the country, were used. This and the use of sunshades, which were of tongued and grooved teak boards hinged at the doorways, and louvres of similar materials, resulted in a vehicle of unusually high tare weight.

Many railways also made a practice of fitting gauze frames in upper class stock, which with louvres and window lights demanded side pillars of considerable thickness. Teakwood louvres have long been superseded by those of aluminium, fitted into teak frames, and with the scientific design of underframes, the use of lighter sections, pressed steel pillars and roof framing and aluminium, tare weights have been much reduced.

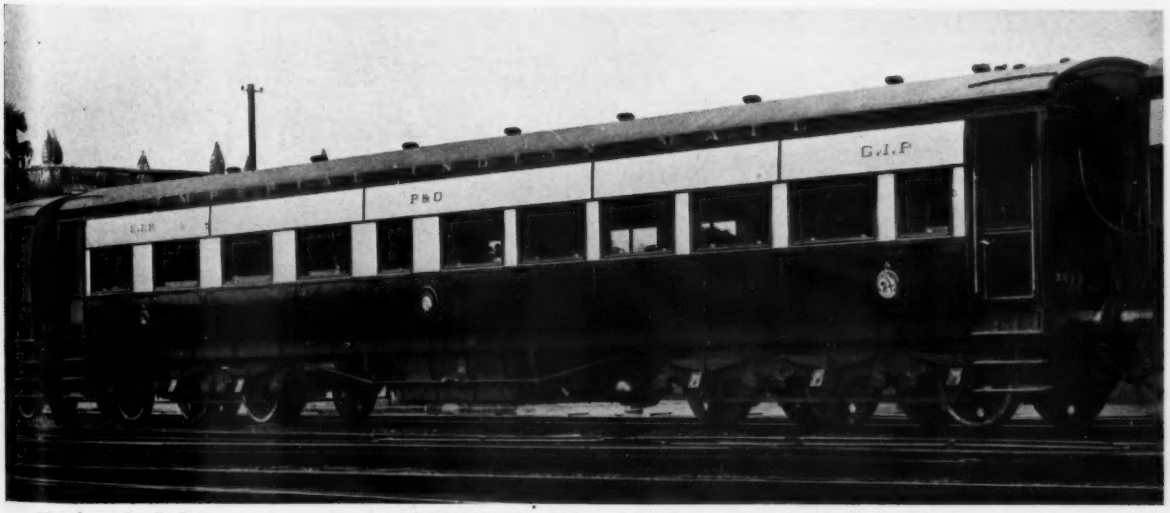
An excellent example of the saving in tare weight is the design of the new multiple-unit electric stock for the Central and Western Railways' Bombay suburban service. This stock was built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. and the Birmingham Railway Carriage & Wagon Co. Ltd., and the electrical equipment was supplied by the English Electric Co. Ltd., and British Thomson-Houston Co. Ltd. It illustrates the advance made in rolling stock design. The use of high tensile steel and aluminium alloy reduced the tare weight of the motor coaches from the 70 tons of the existing motor coaches to 51·8 tons. The stock was described and illustrated in an article of which the first part appeared in our April 27, 1951, issue.

All-steel passenger stock is gradually replacing that with timber framing. At present, new third-class carriages of all-steel construction are being built at Kanchrapara, and Lillooah railway carriage shops, and also by the Hindustan Aircraft Limited, Bangalore. This firm specialises in mass production on aircraft principles of lightweight bodies for third-class carriages as described in our July 20, 1951 issue. Additional capacity will be available on the completion of the new carriage construction works at Perambur. The new designs embody safety features such as an anti-telescoping structure, and more amenities including additional electric fans and stainless-steel fittings.

For many years the Indian railways built their own passenger stock, with the notable exception of all-steel stock operating on the suburban electrified systems of Bombay and Madras; until comparatively recently the majority of underframes and bogies were imported into India. Carriage body designs were suited to the different climatic conditions and customs, and were more or less the responsibility of individual railway administrations, although there was considerable similarity in design.

Standardisation

This system continued until 1924, when the Indian Railways Standards office was formulated for the purpose of standardising rolling stock design, and the first example of the standard design was placed in service a few years later. Considerable economy resulted in manufacture and maintenance. Furthermore, joint inspection at wagon interchange stations was simplified, a smaller stock of wagon details was required, and wagon parts were more readily available, with consequent fewer delays to wagons passing through interchange. The system offers potential savings as the older non-standard stock is replaced.



Twelve-wheel dining car running in the "Imperial Indian Mail" between Bombay and Calcutta about 1930

Single-berth air-conditioned compartment

After about 1900 rolling stock began to take the form and layout of modern design. Some outstanding types of rolling stock designed and manufactured in Britain for the Indian railways in the 1890s are worthy of mention. In 1896 the Leeds Forge Company supplied to the East Indian Railway 38 four-wheel oil tank wagons each of some 4,000 gal. capacity. The tanks were 22 ft. long by 5 ft. 7¾ in. and were encased in corrugated sheeting. Two rotary discharge pumps were fitted, which were capable of discharging at the rate of 2,500 gal. per hr.

The same firm held an exhibition of goods stock and coaches built by it in 1896 for the Barsi Light Railway. The designs aroused considerable interest in that the underframes and bogies were of Fox's patent pressed steel, which, it is recorded, gave the wagon a pay load of some four times that of the tare weight of a timber-built wagon of a similar type, whose pay load was between 1½ times to twice the tare weight. The panel sides of the high-side wagon were pressed to provide the required strength in a manner identical with that of present practice.

A study of the designs of first and second class carriages of the early 1890s will illustrate the great strides made in passenger comfort. A typical example is the design of a first and second class four-wheel composite carriage built by the Eastern Bengal Railway. The carriage was 27 ft. 4 in. over body with a wheelbase of 16 ft. The outer roof was of corrugated sheeting, with a 4½ in. space between the inner ceiling. The vehicles were lighted by gas on the Pintsch system, and a gas cylinder 8 ft. long by 2 ft. dia. was carried below the underframe. Four first and four second class passengers were accommodated and upper berths were provided for night travel. A composite carriage of the South Indian Railway consisting of first, second and third class compartments, was fitted with train lighting equipment by J. Stone & Co. (Deptford) Ltd. in 1895.

In the early 1900s, a few of the railways operated bogie corridor stock on important trains. For various reasons, among them security and privacy, the practice was largely discontinued and the vestibule ends were closed by the fitting of varnished teak panels. Until Partition the broad-gauge "Assam Mail" from Calcutta (Sealdah) to Parbatipur was formed of first and second class vestibule stock up to the dining car. Its metre-gauge continuation from Parbatipur to Amingaon, which was a night journey, was composed of non-vestibule stock throughout. The "Deccan Queen" from Bombay to Poona, first and second class and day travel only, was fitted with end vestibules, as well as stock of certain other Bombay-Poona electrically-hauled day trains. The weekly "Imperial Indian Mail" which between the wars ran from Calcutta to Bombay in connection with the P. & O. mailboats, also was restricted.

Air-Conditioning

Perhaps the greatest advance in passenger amenities was the introduction by the G.I.P.R. in 1937 of air-conditioned stock. During the hot weather in India shade temperatures up to 115° are common. Apart from the heat, an added discomfort to the passenger is dust which persists except for a few months during the monsoon.

In the first instance five coaches were constructed at the Matunga Workshops of the G.I.P.R. The air-conditioning equipment was designed by J. Stone & Co. (Deptford) Ltd. under whose supervision it was installed. Accommodation was provided for 14 passengers. The coaches were attached, one to the "Frontier Mail" of the B.B. & C.I.R. between Bombay Central and Delhi on four days a week, and the others daily to the mail service on the Bombay-Calcutta route *via* the E.I.R. A surcharge of one rupee for every 50 miles or part was levied, but the popularity of the services was such that bookings far exceeded the accommodation available.

Air-conditioned accommodation has been gradually extended, and now is provided on the "Frontier Mail," Bombay Central to Delhi; "Delhi Mail," Calcutta Howrah to Delhi; "Calcutta Mail," Bombay Victoria to Calcutta *via* Jubbulpore, and in Pakistan the North Western Railway mails between Karachi and Lahore.

New multiple-unit lightweight stock on the Bombay suburban section of the Western Railway

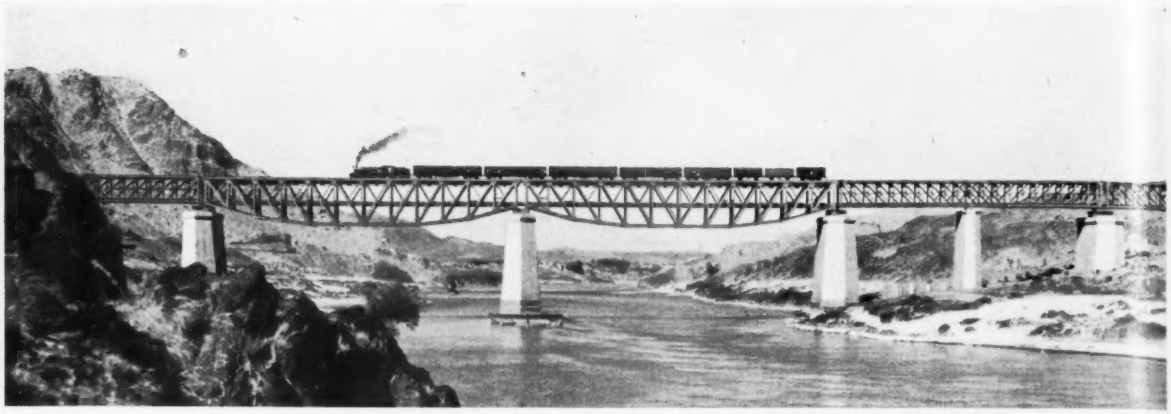
Trans-Indian Expresses

The former "Imperial Indian Mail" ascending the Thull Ghat before electrification between Bombay and Igatpuri; G.I.P.R. 2–6–2 tank at the head and 0–8–4 tank banking in rear

Photos] [P. S. A. Berridge

"Frontier Mail" leaving Delhi hauled by B.B.C.I.R. (now Western Railway) 4–6–2 locomotive

Large Bridges in the Indian Sub-Continent

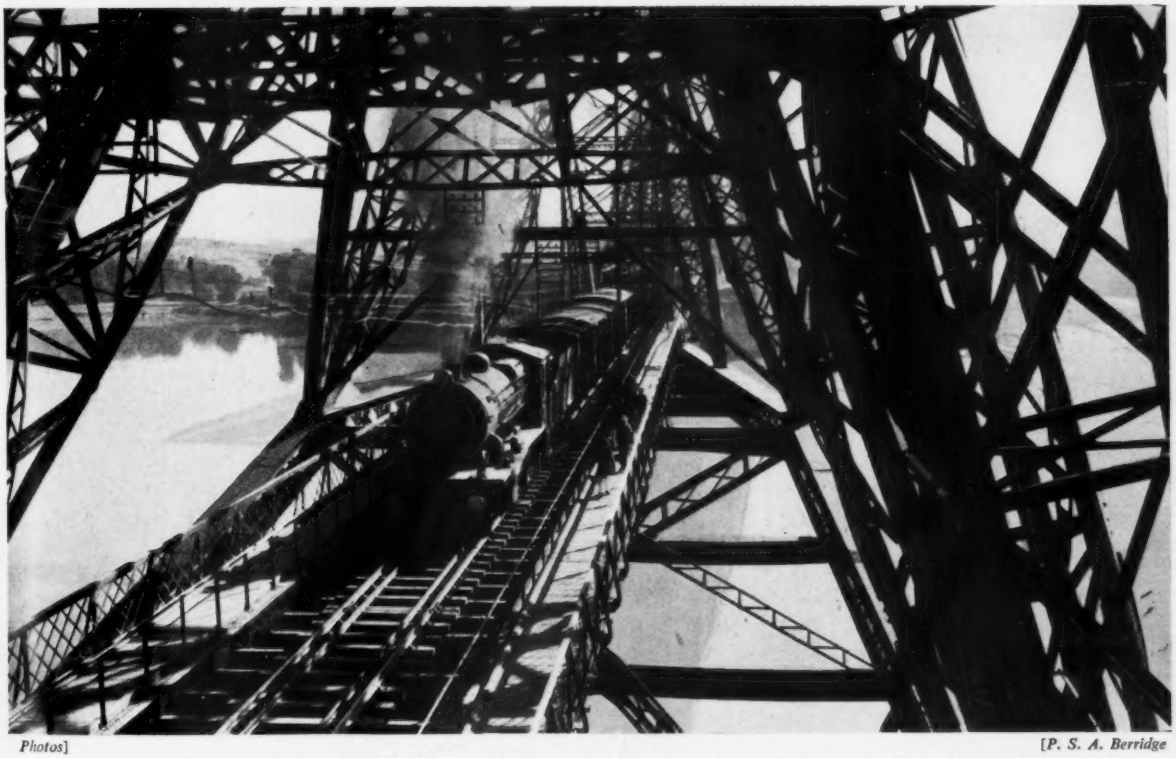


Attock Bridge over the Indus, carrying the Peshawar main line of the North Western Railway, now in Pakistan, on upper deck and the Grand Trunk Road on lower deck

Photo] *Beas Bridge between Jullundur and Amritsar, Northern Railway, India* [P. S. A. Berridge

Willingdon Bridge spanning the Hooghly north of Calcutta, Eastern Railway, India

Combined rail and road bridge over the Jamuna (Jumna) at Delhi, with separate spans for up and down traffic. A test-train is standing on the upper deck



Photos] [P. S. A. Berridge

View looking through the 800 ft. cantilever span of the Lansdowne Bridge over the Indus at Sukkur

Up passenger train hauled by 2-6-2 tank locomotive on the Kalka-Simla 2-ft. 6-in. gauge line

Photos] [*P. S. A. Berridge*

Trains at Sukna Station on the 2-ft. gauge Darjeeling—Himalayan line. Note the wooden rerailing lever, and piles of sand on buffer-beams for hand-sanding

RAILWAY NEWS SECTION

PERSONAL

The Ministry of Transport announces that Sir Arnold Musto and Mr. Gordon Tucker, C.B.E., will retire from their posts as Licensing Authorities in the Western and South Eastern Traffic Areas towards the end of the year, under the statutory provisions as regards age. Mr. S. W. Nelson, Licensing Authority, Northern Traffic Area, will take Sir Arnold Musto's place, and Mr. H. J. Thom, C.I.E., M.C., Licensing Authority, South Wales Traffic Area, will succeed Mr. Gordon Tucker.

Mr. J. Constant Mertens, Deputy Traffic Manager, Iraqi State Railways, who, as recorded in our February 20 issue, has relinquished his position and is at present in England, will shortly take up a senior appointment in the General Manager's Office, East African Railways & Harbours. He leaves by plane on March 28.

Mr. G. H. Waumsley, Inspector-General of Traffic and Acting Traffic Manager, Iraqi State Railways, has returned to England after the expiry of his contract. He has been succeeded as Inspector-General of Traffic by Mr. A. A. Brown.

We regret to record the death, in Cork, Ireland, on March 12, of Mr. J. Macartney Robbins, founder of the Irish Railway Record Society, and for many years a contributor to our associated monthly contemporary, *The Railway Magazine*.

Mr. A. N. Sangenis has been appointed General Administrator, and Mr. A. D. Villarreal, Chief of Traffic Department, Ferrocarril Nacional General Belgrano.

Mr. A. V. Nonzioli has been appointed Chief Accountant, Ferrocarril Nacional General Urquiza, in succession to Mr. Emilio Zina. Mr. M. A. Sinesia has been appointed Chief Stores Superintendent, succeeding Mr. R. F. Cortejarena.

The following staff changes have been announced by Canadaian National Railways:—

Mr. Willard H. Kyle, Montreal, Assistant Vice-President, Operation, has been appointed Vice-President, Central Region, Toronto. He has been succeeded by Mr. Reginald Hayes, Toronto, General Manager, Central Region.

Mr. S. G. E. Chabot, Montreal, Freight Traffic Representative, has been appointed Travelling Freight Agent.

Mr. H. B. McMillan, Montreal, Chief Rate Clerk, has been appointed Lumber Representative in the Division Freight Office, Montreal.

Mr. J. W. Graham, Macdougall, Moncton, N.B., Atlantic Region Counsel, has been appointed Commission Counsel for the system, Montreal. He has been succeeded by Mr. A. H. Hart, Montreal, Company Solicitor.

Mr. F. C. Badhwar, Chairman of the Indian Railway Board, is an engineer by profession and has had a varied and interesting career. After leaving Cambridge University, he worked as a Ship's Engineer on the construction of docks, canals, waterworks and sanitation schemes before joining the East Indian Railway in June, 1925. In addition to constructing new lines, major bridges and some large building projects, he was also associated in the early years of his railway service with the building of a number of power houses and the electrification of large yards and colonies. Experience of railway workshops has also come his way, as he was attached to the Carriage & Wagon Shops at Lillooah for a couple of years. He has also served on the staff side, and was Divisional Personnel Officer of the Allahabad Division in 1940-41. In September, 1941, he was commissioned in the Corps of Engineers and during 1942-43 commanded No. 6 Technical Training Centre at Lucknow. In December, 1943, he was recalled to civil employment, and in April, 1944, was appointed as the Secretary to the Railway Board. In November, 1946, he was posted to the Oudh & Tirhut Railway as Deputy General Manager, and in January, 1947, was appointed as the General Manager of that Railway. In September, 1947, Mr. Badhwar was appointed as Member, Staff, Railway Board, and in August, 1949, became Member, Engineering. On the reorganisation of the Railway Board, from April 1, 1951, he was appointed as its Chairman, which post he holds at present. Mr. Badhwar has travelled extensively and has always made it a point to keep abreast of modern railway developments, both technical and operational, in other countries. He is India's representative on the Permanent Commission of the International Railway Congress Association. Elsewhere in this issue Mr. Badhwar has contributed a special article dealing with the Indian Railways during the past 100 years, and giving the background to the new phase of development initiated by partition and the re-grouping of the lines.

Mr. F. C. Badhwar
Chairman,
Indian Railway Board

We regret to record the death on March 13, at the age of 70, of Mr. D. H. Elias, M.C., General Manager, Federated Malay States Railways, 1933-1937.

The first term of office of the Transport Users Consultative Committee for the London Area having expired on February 28, 1953, the Minister of Transport, the Rt. Hon. Alan Lennox-Boyd, M.P., has appointed the undermentioned persons to be members of the Committee until February 29, 1956:—

Chairman: Mr. J. Fitzgerald, J.P.

Members: Representing Industry and Commerce:—Messrs. W. H. Powell, L. G. Burleigh, M.Inst.T., E. E. Young, W. F. Podmore.

Representing Shipping:—Messrs. C. S. Mundy, O.B.E., W. J. Everard.

Representing Labour:—Messrs. J. Crowley, H. J. E. Palethorpe.

Representing Local Authorities:—Messrs. E. A. Wood, J.P., W. G. Fiske, G. Allison-Beer.

Representing the British Transport Commission:—Messrs. W. H. F. Mepsted, D. McKenna.

Additional member:—Mrs. D. Robinson.

[All of the above-named persons were previously members of the Committee.]

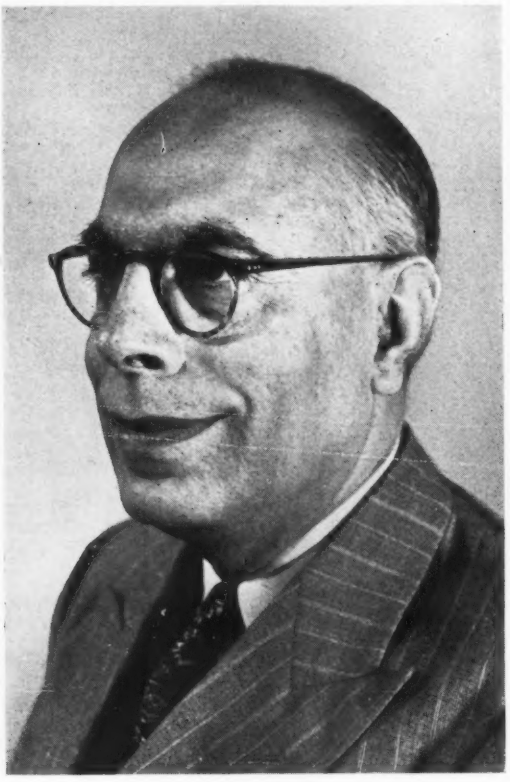
The Secretary of the Committee is Mr. G. Cole Deacon, C.B.E.

The office of the Committee is at 22, Palace Chambers, London, S.W.1.

The Transport Users Consultative Committee for the London Area was established under the provisions of Section 6 of the Transport Act, 1947. The Committee may consider any matter (including charges) affecting the services provided by the British Transport Commission in its area. In particular, the Committee must consider any such matters which arise from representations by users of these services, or which are referred to the Committee by the Minister or the Commission. The recommendations of the Committee are notified to the Central Transport Consultative Committee and to the Commission. Two further members representing local authorities and one representing industry and commerce have yet to be appointed.

Mr. H. P. Hira, B.A., General Manager of the Central Railway, India, was born on January 18, 1900, and educated at the Sind College and St. Xavier's College, Bombay. He took his B.A. degree in Bombay in 1919 and, after a brief course of training on the Great Western Railway at Paddington, he joined the Great Indian Peninsula Railway as a Traffic Probationer in 1925. Mr. Hira subsequently had charge of various divisions of the Commercial Department as Divisional Traffic Manager, Nagpur, Bombay and Jhansi, and was later appointed Goods Superintendent, Wadi Bandar. In April, 1943, he was made Deputy Traffic Manager, and he served as Deputy General Manager (Food Supplies) from July, 1944, to April, 1946. In June, 1947, he was appointed Chief Traffic Manager and, in 1949, he became General Manager, Great Indian Peninsula Railway.

Mr. K. P. Mushran, General Manager, Western Railway, was born on January 1, 1903, and educated at the Government High School and Muir Central College in Allahabad. He qualified as a Civil Engineer from the Thomason College, Roorkee, in 1925, and, in the same year, was appointed to the Indian Railway Service of Engineers. He was posted to the North Western Railway and served in the Punjab, Sind, and Baluchistan on open line and construction, and later as an Establishment Officer. Just before Partition, Mr. Mushran was successively Divisional Superintendent, Delhi, Deputy General Manager, Lahore, Deputy Chief Engineer on Special Duty, and Divisional Superintendent, Rawalpindi. In June, 1947, he was deputed to represent India as a member of the delegation to the International Railway Congress at Lucerne. Mr. Mushran was recalled to India in July, 1947, and was involved in an air crash at Basra on his return journey. On recovery, he was appointed as Director, Establishment, of the Indian Railway Board in October, 1947. In September, 1949, he was appointed General Manager, Bombay, Baroda & Central India Railway. He became General Manager of the Western Railway in November, 1951, the appointment he still holds.



Mr. H. P. Hira
General Manager,
Central Railway, India

Mr. K. P. Mushran
General Manager,
Western Railway, India

The following staff changes have been announced by the South African Administration:—

Mr. A. Swart, System Manager, Kimberley, has been appointed System Manager, Johannesburg.

Mr. P. G. Joubert, Chief Superintendent (Operating), Johannesburg, has been appointed System Manager, Pretoria.

Mr. H. J. G. Seeliger, Superintendent (Planning), Johannesburg, has been appointed Chief Superintendent (Works & Estates), Johannesburg.

Mr. Arnaldo P. Pereira Leite, Sub-Director of the Transportation Services of Mozambique, has been appointed Director-General of that system in succession to Major F. Pinto Texeira, who, as recorded in our November 21 issue, has been appointed Superior Inspector of Railways & Harbours, Mozambique.

Ernest Pugson—An Appreciation

As one whose privilege it was to be associated with Mr. Pugson for 40 years, I would like to pay my tribute to a great and admirable chief. As a Chargeman and also as Millwright Foreman I was closely associated with him, and watched with pride his progress from an apprentice to Works Superintendent, then later to Chief Officer to the Railway Executive for Carriage & Wagon Construction & Maintenance. He was always proud of the fact that he was building on the foundation so well and ably laid down by the late R. W. Reid and Sir Ernest Lemon, whose achievements in Derby Works have never been forgotten by those who knew them, and was the first to accomplish the building of 200 12-ton wagons a week, in addition to the building programme of carriages, and repairs to carriages and wagons.

Mr. Pugson in 1936 undertook the building of the first all-steel and all-welded carriage to be built in railway workshops; this was a great achievement; in his endeavour to accomplish it he spent many hours after normal working time to overcome the numerous problems concerned with welding light materials.

G. LYON,
Millwright Section, C & W Dept., Derby

Mr. V. Jagannath, B.E. (C.E.), Chief Engineer, Southern Railway, India, the system comprising the old Madras & Southern Mahratta, South Indian and Mysore State Railways), graduated in civil engineering from Madras University, and holds a diploma in civil engineering from the College of Engineering, Madras. He joined the Madras & Southern Mahratta Railway in 1925 as an Assistant Engineer, and, after 13 years, nearly 4 of which were spent on new constructions, the Gudivada-Bhimavaram and the Guntur-Macherla Railway, was promoted as District Engineer in October, 1938. During the war he was put in charge as Executive Engineer of important war works. His appointments with the Madras & Southern Mahratta Railway include the posts of Personal Assistant to Chief Engineer, Executive Engineer (Post-War Projects) and Bridge Engineer and, in September, 1948, he was drafted for a short spell as Joint Director, Research, Railway Board. On reversion to his parent railway in March, 1939, he was appointed as Deputy Chief Engineer and, later, as Deputy General Manager. When the Mysore State Railway was taken over by the Government of India in 1950, Mr. Jagannath was appointed as General Manager of that railway, which post he held from July, 1950, to April, 1951, when the Mysore Railway was integrated with the Southern Railway on April 14, 1951. After integration, Mr. Jagannath has successively held the posts of Deputy General Manager and Deputy Chief Engineer, Headquarters, until his promotion on April 21, 1952, as Chief Engineer, Southern Railway. Mr. Jagannath is due to retire from service on April 2, 1953.

Mr. P. K. Sarkar, M.A., Financial Adviser & Chief Accounts Officer, Western Railway, India, joined the East Indian Railway as Accounts Officer in May, 1926, after serving as a Lecturer in Economics in the Presidency College, Calcutta, for a few months. He was in charge of various Divisional and Workshop Accounts Offices and, for a time, the head of the accounting organisation relating to the construction of Willingdon Bridge over the Ganges near Calcutta. In 1935 he was transferred to the Eastern Bengal (later the Bengal Assam) Railway, and was successively Senior Accounts Officer, Deputy Chief Accounts Officer and Financial Adviser & Chief Accounts Officer of that Railway. When India was partitioned in August, 1947, Mr. Sarkar became the Financial Adviser & Chief Accounts Officer of the East Indian Railway. In May, 1951, he proceeded on long leave out of India and toured the United Kingdom and the Continent. When he was in England, he studied the accounting system of British Railways and visited several important railway centres including Derby. On return from Europe in November, 1951, he was posted as Financial Adviser & Chief Accounts Officer of the Western Railway.

Mr. V. Jagannath
Chief Engineer,
Southern Railway, India

Mr. P. K. Sarkar
Financial Adviser & Chief Accounts Officer
Weste.n Railway, India

Mr. Leslie T. Davies, Assistant Managing Director, Richard Thomas & Baldwins Limited, has retired, while remaining on the company's board. He is succeeded by Mr. G. A. Young, General Manager, Ebbw Vale Section, who has also been appointed a Director of the Steel Company of Wales Limited. Mr. Charles G. Gilbertson has retired from the board of Richard Thomas & Baldwins Limited as a result of ill health.

Mr. James Houghton, M.Sc. (Tech.), A.M.I.Mech.E., Chief Tester, Leyland Motors Limited, has been appointed Assistant Research Engineer in the new division recently created for long-term development and research.

Mr. H. Lowles, Stores Superintendent, East African Railways & Harbours, has retired.

Mr. J. E. Robson has been appointed a local Director of Samuel Osborn & Company.

The following elections took place at the Annual General Meeting of the Locomotive & Carriage Institution of Great Britain & Eire, held on February 24:—

Mr. S. T. Clayton, Assistant Motive Power Superintendent, British Railways, London Midland Region, as President of the Institution.

Mr. T. C. B. Miller, District Motive Power Superintendent, British Railways, Eastern Region, as Vice-President.

Mr. F. L. G. Beedham as Hon. Treasurer.

Mr. F. E. Maslin as Assistant & Organising Secretary.

Mr. B. L. Kapur

Public Relations Officer, Western Railway, India

Mr. John Ridley

Chief Traffic Manager, Western Australian Government Railways, 1951-53

Mr. R. F. Wilson

Senior District Engineer, Western Region, British Railways

Mr. B. L. Kapur, B.A., Public Relations Officer, Western Railway, India, served in the army during the last war in the Indian Army Ordnance Corps and as Public Relations Officer at Command Headquarters, Northern & Southern Command, attaining the rank of Major. In July, 1948, he sought release from the army and joined the Indian Railways as Public Relations Officer, Oudh & Tirhut Railway. In September 1949 he was transferred to Bombay to take over the appointment of Joint Public Relations Officer, Central and Western Railways (then G.I.P. and B.B. & C.I. Rlys.). His appointment as Public Relations Officer, Western Railway, followed shortly afterwards.

Mr. John Ridley, Chief Traffic Manager, Western Australian Government Railways, who, as recorded in our March 6 issue, is on leave pending retirement, joined the Western Australian Government Railway service as a temporary clerk in 1911, shortly after his arrival from England, where he had eight years' clerical experience with the North British Railway. In Western Australia he progressed through various important posts in the Traffic Branch, and was appointed District Traffic Superintendent at Northam in 1940. He became Assistant Chief Traffic Manager & District Traffic Superintendent, Metropolitan District, in August, 1949, and, when it was decided to divide this dual position into separate posts, Mr. Ridley was appointed Assistant Chief Traffic Manager in September of that year. He became Chief Traffic Manager in 1951.

Mr. R. F. Wilson, Senior District Engineer in the Civil Engineer's Department, Western Region, British Railways, who, as recorded in our February 20 issue, has retired, entered the service of the Great Western Railway in the New Works Engineer's Office at Paddington in 1912, and, at the outbreak of the First World War in 1914, joined the Royal Fusiliers and served overseas. After demobilisation in 1920, Mr. Wilson was transferred to the Newport Divisional Engineer's Office, and in February, 1923, joined the staff of the Divisional Engineer at Wolverhampton as Assistant. In July, 1933, he was appointed Assistant Divisional Engineer. He was appointed Divisional Engineer at Newport in 1939, being transferred to Wolverhampton in January, 1940, as Divisional (later District) Engineer. Mr. Wilson holds the degree of Bachelor of Engineering of the National University of Ireland and is a Member of the Institution of

Mr. A. E. Robson

Appointed Acting Chief Officer (Carriage & Wagon Construction & Maintenance), Railway Executive

Mr. L. Reeves

Appointed Acting Carriage & Wagon Engineer (E. & N.E. Regions), Doncaster

Mr. W. R. Smith

Appointed Staff Assistant, Mechanical & Electrical and Carriage & Wagon Engineers, Doncaster

Civil Engineers. He played rugby for Blackheath and was an International, having played for Ireland on three occasions.

Mr. A. E. Robson, M.B.E., M.I. Mech.E., Carriage & Wagon Engineer (Eastern & North Eastern Regions), who, as recorded in our March 6 issue, has been appointed Acting Chief Officer (Carriage & Wagon Construction & Maintenance), Railway Executive, served a privileged apprenticeship in the L.M.S. Railway Carriage & Wagon Works at Derby from 1925 to 1930, and, after several years' Drawing Office and general Works experience, was appointed Progress Assistant to the Works Superintendent in 1936. When the L.M.S. Railway undertook in 1938 to produce aircraft components in their shops at Derby, Mr. Robson was put in charge of the development of the project. In 1942 he was appointed Assistant Works Superintendent of the Derby Carriage & Wagon Works, retaining direct responsibility for the extensive aircraft production and repair work then being carried out, and, for his work in this field, he was made an M.B.E. in the King's Birthday Honours, 1945. In that year he was appointed Assistant Locomotive Works Superintendent at Derby, and Locomotive Works Superintendent in March, 1946. In 1948 he became Principal Assistant (Carriage & Wagon) to the Chief Mechanical Engineer, Derby, and, in 1949, was appointed to the newly created post of Carriage & Wagon Engineer (E. & N.E. Regions), Doncaster.

Mr. L. Reeves, M.I.Mech.E., M.I. Loco.E., Assistant Carriage & Wagon Engineer (Eastern & North-Eastern Regions), Doncaster, British Railways, who, as recorded in our March 13 issue, has been appointed Acting Carriage & Wagon Engineer (Eastern & North-Eastern Regions), Doncaster, commenced his railway career as an indentured apprentice with the Great Eastern Railway in 1908, and, after carrying out technical studies at the Great Eastern Railway Institute, obtained a Directors' Full-time Scholarship at the East London College of London University. He occupied various positions at Stratford, where he was appointed Assistant to the Locomotive Works Manager in 1930. In 1933 he was made Assistant Locomotive Works Manager at Darlington, where he became Locomotive Works Manager in June, 1941. He was transferred to Scotland as Mechanical Engineer in May, 1942, and in June, 1945, was promoted Mechanical Engineer, Doncaster. In 1950, Mr. Reeves was appointed Assistant Carriage & Wagon Engineer (Eastern & North Eastern Regions), Doncaster.

Mr. W. R. Smith, Senior Staff Clerk (Wages), Mechanical & Electrical and Carriage & Wagon Engineers' Departments, Doncaster, Eastern Region, British Railways, who, as recorded in our March 13 issue, has been appointed Staff Assistant to the Mechanical & Electrical and Carriage & Wagon Engineers, Doncaster, entered the service of the Great Eastern Railway in 1911 as a junior clerk in the Hotels Department at Liverpool Street Station. He was transferred to the Electrical Engineer's Head Office in 1914 and, after four years' war service with the 56th (London) Divisional Signal Company, Royal Engineers, he returned to that office in 1919. In May, 1928, he was appointed to the headquarters office of the Chief Mechanical Engineer, London & North Eastern Railway, Kings Cross, and, with the exception of two years spent in the staff section of the Mechanical Engineer's Office, Stratford, he remained in the staff section, Chief Mechanical Engineer's Department, until the reorganisation in 1950, having removed to Doncaster with that Department in June, 1941. On the formation of the Mechanical & Electrical Department and Carriage & Wagon Department in 1950, Mr. Smith was appointed Senior Staff Clerk (Wages) in the Joint Staff Office covering both Departments, which position he now vacates.

Mr. W. N. Griffiths, Assistant (Mechanical) to the Motive Power Superintendent, Western Region, British Railways, who, as recorded in our March 13 issue, has been appointed District Motive Power Superintendent, Cardiff, became an apprentice in the Fitting, Turning and Erecting Shops at Swindon Locomotive Works in 1927. He served 9 years in the Drawing Office before his appointment as Assistant to the Divisional Locomotive Superintendent at Cardiff in 1942. Four years later Mr. Griffiths transferred to Wolverhampton in a similar capacity, returning to Swindon in 1950 as Assistant (General) to the Motive Power Superintendent and later as Assistant (Mechanical) to the Motive Power Superintendent.

Mr. Alex. Petrie has been appointed Assistant to Commercial Superintendent (Passenger), Scottish Region, British Railways.

Mr. T. R. Hall, District Motive Power Superintendent, Cardiff, Western Region, British Railways, has been appointed District Motive Power Superintendent, Newton Abbot. He has been succeeded at Cardiff by Mr. W. N. Griffiths.

Mr. J. F. Bickerton, B.Eng.(Liverpool), M.I.C.E., Assistant District Engineer, Paddington, British Railways, Western Region, has been appointed District Engineer, Cardiff.

Funeral of Mr. R. McPherson

There was an attendance of 164 railway officers and staff at the funeral service at Streatham Vale, on Wednesday, March 11, of Mr. R. McPherson, Staff Assistant to the Superintendent of Operation, Southern Region, British Railways.

Among those present at the service were:—

Southern Region: Messrs. S. W. Smart, Superintendent of Operation, H. B. Taylor, Assistant Superintendent of Operation, W. Crawford, Mr. J. H. Brown, and other personal staff. Messrs. A. E. Diggens and F. L. Jagger represented the Regional Staff Officer, Messrs. B. T. Wright, Staff Assistant, (representing Mr. W. H. F. Mepstead, Commercial Superintendent), F. H. Marshall, Staff Assistant, (representing Mr. T. E. Chrimes, Motive Power Superintendent), E. Rampton, Staff Assistant, (representing Mr. F. E. Campion, Civil Engineer), A. J. A. Hollins, (representing Mr. H. H. Swift, Mechanical & Electrical Engineer), District Traffic Superintendents—Messrs. J. Bridger, A. Earle Edwards, W. H. Scutt, N. L. Collins and L. T. Corney (representing Mr. P. A. White), and many of their staff.

Other Regions were represented by:—Messrs. A. Kenyon, (for Operating Superintendent, London Midland Region), F. E. Longhorn, (for Operating Superintendent, Eastern & North Eastern Regions), J. E. Cole and C. J. Pinkham, (for Operating Superintendent, Western Region).

Other representatives attending were:—Messrs. J. A. Fulford, Chairman, D. A. Mackenzie, Secretary, G. W. Wright (retired Secretary) (Staff side Sectional Council No. 1), A. Bassett, Chairman, F. E. Hunt, Secretary, and other members, (Staff side Sectional Council No. 3).

Mr. G. P. Clay has been appointed Chief Engineer, Metals Division, Imperial Chemical Industries Limited.

Mr. H. S. Carter has been appointed Sales Manager, Heating & Welding Department, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester.

Mr. A. Upton, Manager, Switchgear Department, Johnson & Phillips Limited, is resigning shortly to take up an appointment in the U.S.A.

Mr. W. R. Timken, of the United States of America, has been appointed a Director of British Timken, in succession to the late Mr. M. B. U. Dewar.

Mr. Edward Symons has relinquished his appointment as Information Officer of the Vacuum Oil Company in order to take up duties as Economic Writer in the Public Relations Office of the International Bank in Washington with effect from April 15.

Mr. C. "Harry" Green, 71, and Mr. Forbes M. Knowles, 70, have retired from Dean & Dawson, Limited, each with 55 years' service. Mr. Green was Chief Bookkeeper of the Company's Accounts Department. Mr. Knowles was engaged in the same department.

Mr. W. Kemp, Managing Director, Hamworthy Engineering Co. Ltd., has been appointed Deputy Chairman. He is succeeded by Mr. Alasdair F. Ferguson. Mr. James Hendry and Mr. R. G. Peach have been respectively appointed Sales and Technical Directors. Mr. Ingram Spencer, Chairman, is at present on a business visit in Australia.

Mr. W. L. Henderson, A.M.I.E.E., has resigned his position as Assistant Secretary to the Engineers' Guild Limited as from April 1, 1953, which post he has held since 1948, in order to take up a position in industry. He is succeeded by Mr. J. G. Orr, M.A. (Cantab.), a graduate of Cambridge and a barrister-at-law. Until recently, Mr. Orr held a responsible position with the British Motor Trade Association.

The following managerial changes have been announced by Crompton Parkinson Limited:—

Mr. J. V. Daniel has been appointed a Joint Managing Director.

Mr. J. B. Scott, an Executive Director and at present Assistant Sales Director (Home), is to be a Sales Director. From April 1, 1953, he will assume full executive responsibility for both home and overseas sales.

Mr. C. F. Dickson, O.B.E., will remain a Sales Director until June 30, 1953, when he will join the board.

Mr. D. E. Graham, General Sales Manager, Overseas Division, has been appointed an Executive Director.

The following staff changes have been announced by Crompton Parkinson Limited:—

Mr. J. A. Esplin, M.I.Mech.E., has succeeded Mr. F. W. Roberts at Chelmsford as a Senior Traction Engineer (Railways).

Mr. W. R. Gordon is taking over special duties in connection with diesel electric traction. His responsibilities in the Trolleybus Section will be assumed by Mr. A. A. Morris.

Parliamentary Notes

Transport Bill Committee Stage in House of Lords

Reorganisation of railways: Hotels and Docks & Inland Waterways Executives: charges schemes: transport levy

On Clause 14 (Railway reorganisation), when debate was resumed on March 11, Viscount Falmouth moved an amendment providing that the Minister should appoint a committee of not less than six persons, who after hearing the evidence of the B.T.C. and other bodies, should submit a reorganisation scheme to the Minister.

Viscount Swinton (Secretary of State for Commonwealth Relations) pointed out that this would cause delay, and complicate the position of the B.T.C., which was the body most suitable to prepare a scheme, as provided in the Bill. The Commission was to be enlarged, probably in August, and that would bring in new blood.

The amendment was, by leave, withdrawn.

Lord Wolverton said the C.R.Os. of British Railways Regions, if the Railway Executive was to be abolished, should help in any reorganisation scheme. In reorganisation of the railways work should be delegated on a Regional basis.

Lord Hawke said he was satisfied that under the Bill the B.T.C. could form an inter-departmental committee of itself and include R.E. employees.

Area Organisation

Lord Shepherd said it was time that the Area Boards' functions were mentioned in Parliament, which should know them before the Bill reached the Statute Book. What Government spokesmen had said so far was not clear. In England the Area Boards would not be given more authority than the proposed Scottish Transport Council; he could not see how Scotsmen could be pleased at railway decentralisation.

One object of decentralisation, he went on, was to encourage healthy rivalry, but "a national system of railways, all interlocked," was unlikely to be improved in this way. As to the supposed benefits of competition, the history of the rivalry of the East and West Coast Anglo-Scottish services did not show it. The public naturally used one or other, according to geographical and other circumstances, and rivalry did not draw off natural East Coast traffic from that route, and so on. His recollection was that the Blue Ribbon always went to the "Flying Scotsman," because "it had the most direct route and the easiest gradients."

Abolition of Railway Executive

Lord Burden moved an amendment to omit the abolition of the Railway Executive from the scheme of reorganisation. He said that any scheme could be carried out in conjunction with the Commission. Men who had endeavoured to serve the national interest were to be publicly sacked by a clause in an Act of Parliament.

He recalled the names of those who served or were serving on the R.E., including Sir Eustace Missenden and Sir William Slim and the present Chairman, Mr. John Elliot, and Members. These, he said, were men of outstanding ability; as to the latter, the "humblest junior clerk in the railway service" would have had better treatment.

Lord Teynham said that, apart from anything the Government might do, the B.T.C. itself was anxious to get rid of the Railway Executive.

Lord Lucas of Chilworth said that the Government could achieve what they wanted without the Bill. The Minister could, under the Act of 1947, ask the Commission to submit a scheme of reorganisation taking into consideration all factors mentioned in the clause. The Commission had already submitted such a scheme "wrapped in mystery" and probably to be revealed in the future suitably amended by the Minister.

The Earl of Selkirk (Lord in Waiting) said that in the opinion of the Government there were real objections to the executive system. The three-tier system was wrong, and no doubt the Commission would abolish it in due course. A great measure of decentralisation was necessary.

The amendment was negatived.

Hotels and D.I.W.T. Executives

Lord Falmouth moved an amendment to abolish the Hotels and Docks & Inland Waterways Executives. He said that the Hotels Executive was a wholly unnecessary body, and he saw no reason why restaurant cars and refreshment rooms should be run by a different staff. The railway docks were run efficiently by the railways before the war, and did not require any extra staff.

Lord Burden said that catering was a specialised industry, and it would be disastrous to revert to the prewar organisation. Soon the stock joke of alleged comedians about the antiquity of a railway sandwich would be a thing of the past. Anyone looking at the refreshment rooms in some of our larger termini must agree that great changes to the good had been effected, and this good work would continue.

Railway-Owned Docks

Lord Wolverton pointed out that although the original intention of the Labour Government had been to nationalise all docks, only the railway-owned docks had been nationalised under the 1947 Act. He praised the Southern Railway management of Southampton Docks. There was no need for a separate executive for such docks.

As to hotels and catering, the L.M.S.R. had managed these well, with Mr. Arthur Towle in charge, and Mr. Hole under him. Lord Wolverton criticised the present absence of restaurant car menus. Railway catering, he added, should be returned to railway management.

Lord Inman said that he had been Chairman of the Hotels Executive for three years. It still had 45 hotels to operate. There had been many improvements, and if the Executive was abolished a body of experienced persons would have to be set up to deal with the vast organisation under the control of the B.T.C. Later he said the cost of running the Hotels Executive was less than that of running the catering services of the four main-line railway companies.

Lord Selkirk said that the Government did not like statutory executives appointed by Ministers. It was leaving the Commission to say what its relationship should be with the Hotels Executive, and until it received that advice it would not disturb the Executive.

The amendment was, by leave, withdrawn.

Area Financial Results

Lord Falmouth moved an amendment providing for the receipts and expenditure of each of the new areas to be included in the B.T.C. annual accounts.

Lord Swinton pointed out the many difficulties in this, and the amendment was, by leave, withdrawn.

Road Passenger Transport

On Clause 16 (Repeals and amendments relating to the Commission's functions as to road passenger transport), an amendment, moved by Lord Lucas, to give the Commission power to acquire any undertaking if the activities of that undertaking consisted in the provision of passenger road transport services, was negatived.

Charges Schemes

On Clause 18 (Amendments as to charges scheme), Lord Selkirk, replying to an amendment designed to prevent the Transport Tribunal entertaining any application for a new charges scheme less than 12 months after the operation of a previous scheme, said that there was a clause in the Bill to deal with temporary authorisation to increase charges which only operated when the question of costs arose but did not operate if there was a loss in revenue. Much of the accumulated deficits of the Commission today was a failure to raise charges equitably and quickly. Centralised monopolies had not shown much tendency to keep prices down.

The amendment was withdrawn.

An amendment, widening the definition of local authorities for the purpose of making applications to the Tribunal for charges schemes by including urban areas with a population of at least 50,000, was agreed to.

The clause, as amended, was ordered to stand part of the Bill.

On Clause 21 (Special procedure for temporary authorisation of increased charges) an amendment limiting to one month the period within which the commission must apply to the tribunal for confirmation of increases in charges after private hearing of their application was agreed.

Composition of B.T.C.

Lord Lucas, when debate was resumed on March 13, moved amendments to Clause 23 to increase membership of the B.T.C. from 10 to 14, and to provide four full-time Members.

Lord Swinton said the character of the Commission's undertakings would be considerably altered by the Bill. Decentralisation would bring a need for more part-time Members. There was a case for having more than 11 members, as the Bill proposed. It was not known how Regional reorganisation would develop, but if the Commission was larger it would be easier for it to have a link with the Regional boards. There was no guarantee that 15 would be appointed at first. It was a good figure for which there was a precedent

in another field, but he hoped two-thirds would not always be in the scrum.

After further debate, the amendments were agreed to.

Claims of Scotland

Lord Bilsland moved an amendment to ensure that two of the part-time Members should represent Scottish transport interests.

Lord Swinton said that it had always been the intention of the Government that Scotland should be adequately represented. On Report he would be prepared to put down an amendment providing for two Members to be persons appointed after consultation with the Secretary of State for Scotland.

The amendment was, by leave, withdrawn.

On Clause 24 (Miscellaneous amendments as to Commission), Lord Selkirk moved an amendment to enable the Commission, within six months from the passing of the Act, to form companies, either by way of companies it retained itself for running road haulage, or companies under the disposals scheme.

An amendment by Lord Burden, to remove the time limit of six months, was accepted.

Goods Vehicle Licences

On the First Schedule (Rights of obtaining licences for five years for goods vehicles free of charge), Lord Gifford moved an amendment which sought to ensure that the purchasers of transport units were people competent to carry goods for hire or reward.

Lord Swinton said that to restrict the class of purchaser must restrict the market and depress prices.

The Opposition refused to grant leave for the amendment to be withdrawn.

The Chairman (the Earl of Drogheda) said that he was not aware of any precedent he could follow. If leave was not given he must put the amendment for decision. Consent to withdraw must be unanimous.

The Opposition insisted in their action, when the question was put four times, and in a division the amendment was negatived by 44 votes to 14—Government majority 30.

Transport Levy

On Schedule 2 (Rates of transport levy), Lord Swinton moved an amendment to increase the limit of exemption from one ton to 30 cwt. unladen weight. He said that it would exempt another 90,000 vehicles, leaving 500,000 still liable and 420,000 not liable to the levy. It would not be necessary to vary the amount, but the period in which it would operate would be longer. To raise the limit to two tons would involve an increase in the rate of the levy.

The amendment was agreed to.

The Schedule, as amended, was ordered to stand part of the Bill.

The Committee Stage was concluded.

B.T.C. Bill Second Reading

On the motion that the British Transport Commission Bill be read a Second Time, Col. A. Gomme-Duncan (Perth & E. Perthshire—C.) on March 11 moved: "That this House declines to give a Second Reading to a Bill promoted by a body whose operations are conducted in such a way that its rolling stock is dirty, its maintenance inadequate, and its train service unreliable."

The B.T.C. had asked him and others supporting the motion, he said, to give examples, but this was not a matter of individual trains. Although famous trains were living up to their reputation—as well they might—local trains often were in a deplorable state. Dirty trains, he added, were bad for tourism and for the morale of railwaymen. Nationalisation had destroyed railway *esprit de corps*. He also commented on unpunctuality, and pointed out the superiority of French railways in this respect.

Mr. Ernest Davies (Enfield E.—Lab.) gave particulars of improved punctuality, and drew attention to the physical difficulties of the railways. The future of the railways, he added, was in long-distance traffic, whilst the optimum distance for coach operation was up to 100 miles. He advocated some kind of holiday ticket.

Mr. Geoffrey Wilson (Truro—C.) said that A.T.C. would facilitate faster running in fog.

Mr. J. Grimond (Orkney & Zetland—L.) said he did not want the railways looking more spick and span if it meant bigger losses to the Commission. Although much was heard about the shortage of rolling stock, new stock was found for the new "Starlight Specials" to Scotland. He suspected that it had something to do with the British European Airways cheaper services and the decision of a certain firm to run cheap bus services to Scotland. If the B.E.A. and private bus companies continued the good work more rolling stock would be found for such expresses. Later, he advocated cheaper meals in trains.

Mr. P. H. Collick (Birkenhead—Lab.) said the safety record of British Railways was the highest in the world. In 1950 not one passenger's life was lost.

Dirty Locomotives

The standard of cleanliness in locomotives declined, he said, because of the policy of a man connected with private enterprise and whose policy was that locomotive cleaning was a luxury. That had led to deterioration and "the filthy condition" of many locomotives.

Viscount Hinchingbrooke (Dorset S.—C.) said the B.T.C. should economise in those branches of administration which did not directly impinge upon the traveller. The Commission should satisfy the public, after accidents caused by lack of proper maintenance, that appropriate disciplinary action had been taken.

Mr. A. J. Champion (Derbyshire S.E.—Lab.) said the railways had been starved for a long time of the capital expenditure. The biggest factor had been the shortage of steel.

Brighter Stations

Mr. Alan Lennox-Boyd (Minister of Transport) agreed that there was great room for improvement, but said they must remember the long years of war. Cleaning a large number of vehicles which should have been scrapped was disheartening. There was room for improvement also in the habits of the travelling public, despite the money spent on education.

The railways, he went on, were conducting a vigorous campaign to improve the appearance and general cleanliness of their rolling stock. Sir Daril Watson, Member of the Railway Executive, had been asked to undertake a special survey on how to improve the appearance of the railway stations. Of a total of 6,000, some 4,400 would have been repainted by the end of the year. The break-up of the old railway systems and of the *esprit de corps* had not contributed to efficient running. There was still a shortage of wagons and many of those in use were over age. The railways were also short in the numbers of locomotives needed.

The amendment was, by leave, withdrawn, and the Bill was read a Second Time.

Report Stage of Iron & Steel Bill

When the House of Commons went into committee on re-committal of the Iron & Steel Bill on March 4, Mr. Duncan Sandys (Minister of Supply) moved a series of amendments on Clause 4 (Production Facilities) to enable the Minister, if empowered by the Board to undertake the provision of facilities for development of oversea raw materials in the event of the Board failing to secure provision of these facilities by the industry. The amendments were confined to iron ore, and included power for the Government to provide transport facilities. They were agreed to.

Schuman Plan

On the Report stage, Mr. Sandys moved a new clause to provide for consultation between the Board and the Government on policy as to the European Coal & Steel Community.

The new clause was read a second time and added to the Bill.

On Clause 2 (Iron & Steel Board), Sir Reginald Manningham-Buller (Solicitor-General) moved an amendment to provide that the Minister should satisfy himself before appointing the Chairman or a whole-time Member of the Board that they had no substantial financial interest in any iron or steel undertaking. It was agreed to.

Powers of Board

Mr. G. R. Mitchison (Kettering—Lab.), when the debate was resumed on March 10, moved an amendment to provide that the Iron & Steel Board should supervise not only the production of steel but also distribution.

Mr. A. R. W. Low (Parliamentary Secretary, Ministry of Supply) said efficient distribution by the industry was already covered in the Bill. The Board would be concerned to see that the general marketing arrangements of the industry met the needs of all consumers. The Government alone was qualified to judge between the competing claims of the iron and steel using industries.

The amendment was negatived.

Iron Foundries

Mr. F. Lee (Newton—Lab.) moved to omit the subsection which removed iron foundries from the supervision of the Board. He said that when the Minister introduced the subsection on the Committee Stage he bowed to pressure from the foundry owners.

The amendment was negatived.

Mr. Boyd-Carpenter moved the first of two amendments designed to provide, among other things, that the Agency, when disposing of the undertakings of the industry to private ownership, should secure that the consideration obtained was financially adequate. They were agreed to.

The Report Stage was concluded.

Iron & Steel Bill Third Reading

The Third Reading of the Iron & Steel Bill was carried in the House of Commons on March 17, with a Government majority of 33.

Mr. G. R. Strauss (Lambeth, Vauxhall—Lab.) former Minister of Supply, repeated, in his final speech, the Opposition threat to restore the industry to public ownership at the first opportunity.

Mr. Duncan Sandys (Minister of Supply) wound up for the Government. He appealed for acceptance of the Bill as "a fair, reasonable and lasting settlement."

B.T.C. Charges Scheme Before Tribunal

Basis of proposed increase of London Transport ordinary Underground and bus fares

March 11, the third day of the hearing by the Transport Tribunal of the application by the British Transport Commission for its Passenger Charges Scheme, 1953, was occupied at first with legal argument over the right of the London Trades Council to appear as an objector. This was disputed by the London Federation of Trades Councils.

After hearing the status and proclivities of the London Trades Council defined at some length, the Chairman, Mr. Hubert Hull, said the point was not what they called themselves. They could call themselves Abracadabra Limited if they liked. If they were a body, and they no doubt were a body, and they did represent a class of persons who used passenger facilities, whether they were affiliated or not to the T.U.C. did not matter The tribunal was not prepared to say that the London Trades Council had not *locus standi*.

Sir Reginald Wilson, Comptroller of the British Transport Commission, said that if sub-standard fares were raised to the level of ordinary fares, it would mean a reduction of £1,200,000 in the fare increase now being sought. The Commission did not want to raise these sub-standard fares, in case of further Government intervention.

Cross-examined by Mr. Turner-Samuels, Sir Reginald Wilson said he thought the result of a cheap mid-day ticket in London would be a net loss on balance, whatever the reduction. No provision had been made in the present scheme to allow for the latest increase in the cost of coal. This increase, over an average year, would cost the Commission something over £4 million. He was not prepared to say whether the Commission was prepared to accept this cost without introducing another scheme. It had not been decided.

How much of the £4 million was attributable to passenger undertakings depended to some extent on the cost of electricity. The additional cost to London Transport would be in the order of a few hundred thousands. The present scheme would not be able to absorb as much of the £4 million as was attributable to passengers.

At the resumed hearing on March 12 Sir Reginald Wilson agreed with the proposition of Mr. Geoffrey Lawrence, Q.C., appearing for eight county councils, that in searching for additional revenue it was no use trying to get it from ordinary fares on British Railways, because these were already high in relation to others. The main reason why they were seeking the increase from London travellers was that they formed a class which was not paying for the cost of its travel.

London Transport Maintenance Arrears

In later cross-examination Sir Reginald Wilson said it looked as though almost the whole of the maintenance arrears from the war had now been overhauled so far as the London Transport Executive was concerned. He agreed that at the end of the war, the London Passenger Transport Board had some £40 million standing to its credit in a renewal account, and that such renewals but for nationalisation, might well have been paid for out of it. If this had been done, London would not have had to pay its share of interest on money borrowed to make the renewals.

It seemed likely that some time this year, the Commission would have to carry out an accounting and engineering survey to decide whether, if the abnormal maintenance arrangements for London were terminated, it would be proper to start London off with an equalisation account of some kind or other.

Mr. C. Osmond Turner, representing the London Passengers' Association, when hearing was resumed on March 16, suggested that the B.T.C. thought largely in terms of increasing fares, while other corporations took a different view.

Sir Reginald Wilson asked to be shown any corporation that had not put up its prices in the last four or five years. The Commission's prices had had to be increased because other people's prices had gone up first. He denied that the biggest factor in the cost of coal was the rise in freight charges; the B.T.C. got its coal at pithead price.

Asked why it had been decided to run the "Starlight Express" to Scotland, he said this was done because it was thought to be sound business in the circumstances.

Replying to Mr. D. J. D. Wellum, Treasurer of Benfleet & District Railway Travellers' Association, Sir Reginald Wilson said that the generality of the London travelling public was being asked to pay something on the basis of a calculation which took account of the fact that the yield had decreased after the last inquiry as a result of Government intervention. Some passengers benefited as a result of the Government intervention, and now it had to be paid for by all the passengers.

Mr. Valentine on L.T.E. Fares

Mr. A. B. B. Valentine, Member of the London Transport Executive, when the hearing was resumed on March 17, said in evidence that since the summer of 1952 there had not been any significant trend in traffic upward or downward. December, 1952, was a notoriously bad month, owing to the fog. The actual receipts in the last 43 weeks of 1952 were only £212,000 above the estimated figure—an equivalent of one-half of one per cent.

They assumed that the traffic for 1953 would be the same as in 1952, and the Executive concluded that the figure would be round 67½ million.

The considerable measure of assimilation of the standard scales of charges on all forms of transport in the London area, first authorised in October, 1950, would be preserved, as this principle resulted in much closer equality of charges for comparable journeys.

Referring to the L.T.S. line, Mr. Valentine said its inclusion in the 1950 scheme was the only means by which certain anomalies could be removed; and its retention in the 1952 scheme and in the present draft scheme in no way prejudiced users of the line.

The scale of London Transport ordinary fares was of predominant importance, he added. It had been suggested in the course of the hearing that the bulk of the peak traffic was covered by early morning and season tickets, but the Executive could not accept that. Early morning and season tickets only accounted for 27 per cent of journeys, whereas the ordinary fares accounted for 71 per cent. Generally, there was very little alteration.

The two fares to escape increase would be those which bore the heaviest proportionate increase last time. The result was that the rate per mile was quite smoothly graded from 2d. a mile almost down to 1½d. a mile on long distances.

With the proposal to increase the 3d. fare to 3½d., the yield from the alteration would be more than one-quarter of the minimum additional revenue required from the London Area as a whole. It would be technically impracticable to increase any of the other fares unless the threepenny fare was increased.

Mr. Valentine added that the L.T.E. had no prejudice against cheap fares as such. The fact that they were successful in the provinces was no ground for thinking that reductions of charge would be a commercial success in London. The present average charge per mile for all traffic in the London area was 1·28d., and on British railways outside the London area it was 1·4d.

British Railways Summer Services

Faster Anglo-Scottish day services: Euston-Birmingham in two hours: further accelerations in East Anglia

British Railways 1953 summer passenger timetable will be in force from June 8 to September 20, as against June 30 to September 14 last year. Accelerations are the result of main-line track improvements, with a smaller number of speed restrictions on many routes; a maximum speed of up to 90 m.p.h. is now permitted, for example, over most of the West Coast and over 120 miles of the East Coast route to Scotland. Progressive introduction of new standard locomotives also is contributing to faster schedules.

Announcing these services, Mr. John Elliot, Chairman of the Railway Executive, stated on March 12 that the weekly summer mileage would be about 4,350,000. That was about the same as last year but better distributed. In 1939 this figure was about 5,250,000 miles, but now they were restricted by coal supplies.

The Railway Executive, he added, thought it better to have a high overall average of speed on many trains than "a spectacular few." Research showed that what the public appreciated most was a comfortable ride in good modern stock that was clean and smart, a fair and reasonable price, and punctuality. They would rather have these things than be hurtled along at the expense of comfort. In U.S.A., Mr. Elliot pointed out, passengers by some high-speed trains had asked for and obtained some deceleration.

He drew attention to the 6,000 obsolete coaches overdue for replacement which were hard to make look clean; main-line trains, he said, were as clean or smart, or more so, than before the war, though shortage of cleaners in some industrial areas meant that some local trains there were below standard.

Anglo-Scottish Services

The principal day service between King's Cross and Edinburgh Waverley, to run from June 29 and to be named the "Elizabethan," will cover the 392¾ miles in each direction nonstop in 6¾ hr. at an average speed of over 58 m.p.h., 22 min. faster than last summer. Other long-distance expresses on the East Coast route,

including the "Queen of Scots" will be accelerated by from five to 25 minutes.

On the West Coast Route, the "Royal Scot" will leave both Euston and Glasgow Central at 10.0 a.m., as now, but will be due either terminus at 5.30 p.m., an acceleration of 30 min. over last summer.

Euston—Birmingham in Two Hours

Five trains each way will run between Euston and Birmingham New Street, 112¾ miles, with one intermediate stop, in 2 hr.

Over the Cheshire Lines between Manchester Central and Liverpool Central, the hourly-interval express service will be accelerated from 50 min. overall running time to 45 min., retaining existing stops.

Norwich via Cambridge Accelerations

In East Anglia, introduction of additional "Britannia" Pacifics will enable engine workings and train services on the Liverpool Street-Cambridge-Norwich line to be reorganised in conjunction with the accelerated services already in operation over the Colchester main line. This will not only give accelerations averaging 10 min. between London and Cambridge and 20 min. between London and Norwich *via* Ely, but will also enable the services to be worked with fewer engines and coaches; the financial economy will be more than £60,000 a year. The new service will be on a regular-interval basis at 24 or 54 minutes past the hour from Liverpool Street, and at 15 or 45 minutes past from Cambridge.

West of England and South Wales

On the West of England and South Wales routes to and from Paddington, two expresses will be accelerated to make start-to-stop runs at over 60 m.p.h.; and seven trains will be speeded-up from 10 to 40 min.

The mile-a-minute timings will be the 11.15 a.m. Paddington to Bristol ("Merchant Venturer"), which will cover the 106.9 miles Paddington to Bath in 106 min.; and the 12.0 noon Bristol to Paddington, which will run the 77.3 miles Swindon to Paddington in 77 min.

Eighty-Minute Timing to Folkestone

In the Southern Region, the 10.8 a.m. Sandwich to Charing Cross and 4.15 p.m. return train will be accelerated by 3 and 5 min. respectively between Folkestone Central and Charing Cross, restoring the prewar timing of 80 min. for 71 miles, including a stop at Waterloo Junction. This service is being named the "Man of Kent." Another feature will be a day Channel Islands service *via* Southampton in each direction on Sundays.

The number of summer service trains each week on which seats can now be reserved is 5,670, 140 more than last year. Arrangements for restaurant and buffet car services are not yet final but there will be more than last summer when 1,944 trains each week included restaurant cars and 2,034 included buffet cars.

Cambridge District Stationmasters' Annual Luncheon

The seventeenth annual luncheon of stationmasters in the Cambridge District was held at the Lion Hotel, Cambridge, on March 14.

Mr. J. W. Dedman, District Operating Superintendent, Cambridge, who presided, proposed the toast of British Railways, and welcomed the guest of honour, Mr. John Elliot, Chairman of the Railway Executive. He referred to the interest shown by Mr. Elliot in the problems of the Eastern Region and Cambridge District and to the achievements in 1952 of the District in freight and passenger operating.

Mr. John Elliot, replying, stressed that British Railways were not "in the red," as unfortunately seemed widely supposed. Since 1948 they had not cost the British taxpayer a farthing. In 1951 they had earned a surplus which enabled them to pay their full contribution to British Transport Commission central charges including the 3 per cent interest on Transport Stock. Results for 1952 probably would be found to be as good when published; and there was no reason why 1953 should not be equally good. All British railwaymen should know this, and must not be disheartened by ill-informed criticism.

The railways, Mr. Elliot went on, were essential to the national economy. They should be left alone to work out their own salvation; but they would survive whatever changes were brought about by the Transport Bill. They were not obsolete, but must concentrate on the spheres of transport for which they were best suited.

Freedom in Charging

The new Bill would result in greater freedom for the railways in charging. This was largely the "Square Deal" for which the railway companies had asked before the war. Restrictions now obsolete would be removed. Rates, however, were not everything; people were prepared to pay for good service. Competition also was a wholesome stimulus.

New Passenger Timetables

Mr. Elliot wished success to the Region and District, and praised their work during the past year. The accelerated summer passenger timetable for the London-Norwich *via* Cambridge service, he said, was first class. Stationmasters could not make a bad timetable work well, but they could spoil a good one. They should keep their stations clean and tidy. Coaching stock should be kept as clean as possible, though the high proportion of stock overdue for replacement made this difficult.

Mr. W. A. Cox, Stationmaster, Bishop's Stortford, proposed the toast of the visitors. He referred to the good work of Eastern Region staff in dealing with the floods on the East Coast and in the Thames estuary, and to the great improvement in recent years in welfare and technical educational facilities for railwaymen and in the relationship between men and management.

Mr. C. K. Bird, Chief Regional Officer, Eastern Region, replied. Only teamwork by railwaymen, he said, could justify Mr. Elliot's optimism as to the future of the railways. The accelerations in East Anglia last year and this summer were the result of hard work both at headquarters and on the ground. Besides teamwork and industry, it was important to have the ideas of all members of the staff on improving services.

Others present from the Eastern Region included:

Messrs. E. W. Rostern, Operating Superintendent; A. R. Dunbar, Divisional Operating Superintendent (Eastern); W. E. Blakey, Assistant Commercial Superintendent; G. F. Fiennes, Assistant Divisional Superintendent (Eastern); J. L. Salmon, Editor, *British Railways Magazine*.

Messrs. R. E. Lawler, District Commercial Superintendent, Ipswich; E. O. Lloyd, District Goods Superintendent, London Suburban; and the following from Cambridge: Messrs. A. J. Johnson, District Commercial Superintendent; E. D. Robinson, District Engineer; G. Sutcliffe, retired District Operating Superintendent; M. D. Thompson, retired District Commercial Superintendent; A. H. Rees, retired District Motive Power Superintendent; C. V. Barrett, Assistant District Operating Superintendent; E. Hopkin, Assistant District Commercial Superintendent; and R. D. Gardiner, Assistant District Motive Power Superintendent.

Staff & Labour Matters

Engineer Wages

The C.S.E.U. executive council at a meeting in York on March 12 decided to convene a wages conference in London on April 29. The conference will comprise representatives of the 38 unions affiliated to the C.S.E.U.; before that date the various executives of the unions will have had an opportunity of considering their wages policy in relation to the budget. It is expected that concrete proposals regarding wages will be made at the next meeting of the executive council of the Confederation in a month's time.

Contracts & Tenders

The Indian Government has placed the following further contracts under the 1953 programme:—

Baume & Marpent S.A., Marpent, France: 1,000 "MOX" open wagons, metre gauge.

Krauss Maffei A.G., Munich: 25 boilers for "XB" locomotives.

The East African Railways & Harbours have ordered 93 Dunlopillo mattresses.

British Railways, North Eastern Region, have placed the following contracts:—

W. R. Payne & Sons: Cleaning and painting station buildings, warehouses, bridges, signal-boxes, on the Blyth and Tyne, Tynemouth, and Ferryhill and Pelaw branches.

Randle & Co. Ltd.: Erection of new station building and new platform shelter extension at Seaburn.

L. C. Abdale & Sons: Standard brick and timber traders' store, Barnard Castle.

Wm. Jones Limited: One excavator and tractor for site preparation work, new motive power depot, Thornaby.

British Railways, Eastern Region, have placed the following contracts:—

R. F. Herron Limited, Ruislip: Repairs to roof of North Locomotive Shed, Grantham Motive Power Depot.

Samuel Butler & Co. Ltd., Leeds: Demolition of Exchange Footbridge No. 59D at Sheffield Midland Station.

J. Willmott & Sons (Hitchin) Limited: Temporary repairs to roof, Doncaster Carr Motive Power Depot.

Sadler & Sons, Ipswich: Office accommodation for District Outdoor Machinery Engineer's Staff, Parkeston Quay.

George Simpson (London) Limited, London, S.W.1: Repairs to and reconstruction of engine shed roof, Lowestoft Motive Power Depot.

The Special Register Information Service of the Board of Trade, Commercial Relations & Exports Department, reports that the United Kingdom Trade Commissioner at Delhi has notified a call for tenders issued by the Directorate General

of Supplies & Disposals, Government of India, for the supply of:—

1,140,500 M.S. split cotters for CST9 type C.I. plate sleepers for 90 lb. " R " FFBSS to IRS(T) drawing No. T-432.

100,000 M.S. split cotters for 90 and 75 lb. RNWR type C.I. plate sleepers as per N. Rly. H.Q.E. plan No. 44 (DGSD No. 7217).

300,000 M.S. cotters for D & O plate sleepers for 88½ lb. B.H. rails as per E.I.R. drawing No. B/1055/33 (I.S.D. No. 8105).

Tenders should reach the Director General of Supplies & Disposals, Shahjahan Road, New Delhi, by 10 a.m. on March 30. A copy of the tender documents is available for inspection at the Board of Trade by representatives of United Kingdom manufacturers. A further copy is available on loan. Reference CRE/9477/53 should be quoted.

The Commercial Relations & Exports Department of the Board of Trade reports that the United Kingdom Trade Commissioner at Delhi has notified a call for tenders issued by the Directorate General of Supplies & Disposals, Government of India, for:—

31,350 keys (M.S.) (left) for trough sleepers for 90 lb. R.B.S. rails.

Tenders should reach the Director General of Supplies & Disposals, Shahjahan Road, New Delhi, by 10 a.m. on March 31, 1953. A copy of the tender documents is available for inspection at the Board of Trade by representatives of interested United Kingdom manufacturers. A further copy is available on loan Reference CRE/9578/53 should be quoted.

The Special Register Information Service of the Board of Trade, Commercial Relations & Exports Department, reports that the United Kingdom Trade Commissioner at Delhi has notified a call for tenders issued by the Directorate General of Supplies & Disposals, Government of India, for the supply of:—

32 spindles and buckles, slide valve, for " F " class locomotives, and 16 for tank engines.

Tenders should reach the Director General of Supplies & Disposals, Shahjahan Road, New Delhi, by 10 a.m. on April 2. A copy of the tender documents is available for inspection at the Board of Trade by representatives of United Kingdom manufacturers. A further copy is available on loan. Reference CRE/9607/53 should be quoted.

Notes and News

Vacancy for Engineer.—Applications are invited for the post of engineer, between 25 and 35 years of age, required by a firm of rubber consultants and manufacturers in London drawing office. Some railway experience an advantage. See Official Notices on page 355.

New Zealand Government Railways.—Applications are invited to fill vacancies for signal and electrical engineers in the Government railway service of New Zealand. Applicants should have had experience in railway signalling and communications, and also general electrical engineering work. See Official Notices on page 355.

Model Railway Club Exhibition.—The Model Railway Club Exhibition will be held at the Central Hall, Westminster, from April 7 to April 11. The price of admission will be 2s. 6d. (child under 14 years, 1s. 3d.). The exhibition will open at 2 p.m. on April 7, and thereafter at 10.30 p.m. and will close at 9.30 p.m. on each day.

Record British Railways Coal Traffic.—More deep-mined and opencast coal was carried by British Railways last week than any week since December, 1949; the total was 3,374,680 tons. The weekend figure was 410,180 tons. During the week ended March 7, 220,926 tons of iron and steel from the principal steel works, and 321,000 tons of iron ore were conveyed.

O.E.E.C. Inland Transport Conference.—Problems arising from the present organisation of European inland transport by road, rail, and inland waterway are being discussed at a conference which began on March 18 at the Château de la Muette under the auspices of O.E.E.C. The conference, attended by representatives of O.E.E.C. member countries and the U.S.A., with Spain and Jugoslavia, will probably last three months. Its main task is to study the existing organisation and regulation of international transport, and means of making better use of the existing transport system and promoting its rational development. The British delegation is headed by Brigadier A. E. M. Walter, Director of the International Inland Transport Branch of the Ministry of Transport.

Women's First Aid Competition, Western Region.—Newton Abbot won the Western Region Women's First Aid Competition with 291½ marks, and Swindon was runner-up with 246 marks. Doctor E. J. Selby was the adjudicator in the team test and Doctor A. H. Jones in the individual tests. The subsequent proceedings were presided over by Mr. R. Burgoyne, Regional Staff Officer, who was supported by Mr. K. W. C. Grand, Chief Regional Officer; Doctor C. T. Newnham, Regional Medical Officer; Mr. H. R. Webb, Stores Superintendent; and Mr. P. Anstey, Regional Ambulance Secretary. The trophies and prizes were presented by Mrs. Grand. The Newton Abbot team will compete in the British Railways and London Transport (Railways) Competition for Women which is being arranged by the St. John Ambulance Association to take place at the Central Hall, Westminster, on May 21.

February Iron and Steel Production.—Steel production in February reached a record weekly average rate of 352,400 tons; the previous best weekly rate was for January of this year, when the rate was 346,300 tons, and the rate for February, 1952, was 313,100 tons. Pig iron production was at a weekly average rate of 213,500 tons in February, compared with 213,900 in January and 197,400 in February, 1952.

Institute of Transport: 1953 Brancker Memorial Lecture.—The 1953 Brancker Memorial Lecture, which had been arranged for February 9 and was postponed because of the illness of the lecturer, will now take place on Wednesday, April 15, at 5.45 p.m. in the Jarvis Hall, 66, Portland Place, London, W.1. Sir Frederick Handley Page, past President, will deliver the lecture on " The Influence of Military Aviation on Civil Air Transport."

Congratulatory Telegram from Lord Hurcomb to Chairman of Indian Railway Board.—Lord Hurcomb, Chairman, British Transport Commission, sent the following telegram to Mr. F. C. Badhwar, Chairman, Indian Railway Board. " As Chairman of the British Transport Commission I send you on behalf of my colleagues and of the 600,000 men and women who staff our British Railways our warmest congratulations and best wishes

Mrs. K. W. C. Grand presenting the trophy to the Newton Abbot team, winners of the Western Region Women's First Aid Competition

OFFICIAL NOTICES

The engagement of persons answering Situations Vacant advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

YOUNG ENGINEER required by well known firm of Rubber Consultants and Manufacturers in London Drawing Office with view to eventually taking control. Permanent position and Superannuation fund. Salary commensurate with qualifications and experience. Applicants should preferably be aged 25 to 35 and have some Railway experience. Write stating age, qualifications and experience to Box 770, *Railway Gazette*, 33 Tothill Street, London, S.W.1.

THE "PAGET" LOCOMOTIVE. Hitherto unpublished details of Sir Cecil Paget's heroic experiments. Eight single-acting cylinders with rotary valves. An application of the principles of the Willans central-valve engine to the steam locomotive. By James Clayton, M.B.E., M.I.Mech.E. Reprinted from *The Railway Gazette*, November 2, 1945. Price 2*s*. Post free 2*s*. 3*d*. *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

NEW ZEALAND GOVERNMENT RAILWAYS

APPLICATIONS are invited to fill vacancies for SIGNAL AND ELECTRICAL ENGINEERS in the Government Railways Service in New Zealand. Applicants, who should preferably have had experience in Railways signalling and communications, and also general electrical engineering work, would require to become corporate members of the Institution of Electrical Engineers as soon as practicable after appointment, if not already members. They would also require to become registered in due course in New Zealand. It is essential that the colour vision of all candidates should be normal. Commencing salary:—£605 (NZ) to £1,030 (NZ) according to qualifications and experience after graduation. Further particulars, conditions of appointment and application forms, may be obtained on request from:—THE HIGH COMMISSIONER FOR NEW ZEALAND, 415, Strand, London, W.C.2., mentioning this paper and quoting reference A.3/36/34. The closing date for receiving completed applications is April 24, 1953.

N.E.R. HISTORY.—Twenty-Five Years of the North Eastern Railway, 1898-1922. By R. Bell, C.B.E., Assistant General Manager, N.E.R. and L.N.E.R. Companies, 1922-1943. Full cloth. Cr. 8vo. 87 pages. 10*s*. 6*d*.—*The Railway Gazette*, 33, Tothill Street, London, S.W.1.

REQUIRED by the Central Railway of Peru two Locomotive Assistants preferably single and between 26/30. Qualifications: Full apprenticeship with British Railways or Locomotive Builders and experience in one or more of the following: Railway Machine Tool Operation. Welding Boiler works, Locomotive Running or Drawing Office. Also two fully trained Steam Locomotive Engineers aged between 30/45. Experience preferably in South America with locomotive running or locomotive workshops in supervisory positions. A.M.I.Mech.E., desirable and knowledge of Spanish essential. Apply SECRETARY, PERUVIAN CORPORATION LTD., 144, Leadenhall Street, London, E.C.3.

ACCOUNTANT (TRAFFIC AUDITOR) required by the Central Railway of Peru—about 30 years of age, preferably single, with general auditing and railway accounting experience, knowledge of Spanish desirable but not essential. Apply—THE SECRETARY, PERUVIAN CORPORATION LTD., 144, Leadenhall Street, London, E.C.3.

BOUND VOLUMES.—We can arrange for readers' copies to be bound in full cloth at a charge of 25*s*. per volume, post free. Send your copies to the SUBSCRIPTION DEPARTMENT, Tothill Press Limited, 33, Tothill Street, London, S.W.1.

on the occasion of the Indian Railway Centenary on April 16. That such an historic occasion should be marked by an Exhibition in New Delhi will implant firmly in the minds of all who go to the Exhibition the full significance of the Centenary itself, and will also go a long way towards emphasising to your vast public the splendid progress made by the railways of India. We wish you every success." Mr. Badhwar replied: "Thank you very much for the congratulations conveyed in your telegram of 10th instant. We have always admired and learnt much from British Railways and on behalf of the 900,000 staff serving on Indian Railways please accept deepest appreciation of your good wishes."

Improvements at Birkenhead Woodside.—The London Midland Region has been renovating Birkenhead Woodside Station during the last twelve months. The work has included the erection of a new platform barrier in tubular steel, modernisation of station signs, improved traffic and commercial advertising display, and reglazing of the station roof. The washing-down of the walls revealed soft red brick with grey sandstone medallions and facings to doors and windows which has considerably enhanced the station appearance.

Innoxa Barrier Creams.—Demonstrations of protective barrier creams for the prevention of occupational dermatitis were given on March 12 by Innoxa Laboratories, 170, New Bond Street, London, W.1. They included the removal from a person's hands of graphite, a mixture of heavy lubricating oils, carbon black, tar, paints and bostik, BD7 cream having been first applied to the skin. Protection against acids, alkalis, and solvents is given by BW2 cream. In one demonstration the cream was applied and the hands then submerged in a bowl of full-strength hydrochloric acid. Eight different barrier creams are available, marketed in this country under the name of Innoxa and abroad as Kerodex.

New Air Services Approved.—The Minister of Civil Aviation has approved 10 scheduled air services to be run by private operators to and from North Eastern England. Eight are to be run by Hunting Air Transport and the other two are inclusive tours to be undertaken by B.K.S. Aerocharter. The Hunting services are: Newcastle-London (Bovingdon), Newcastle - Manchester, Newcastle - Glasgow; Newcastle - Oslo - Stockholm; Newcastle-Amsterdam-Düsseldorf; Newcastle-Hamburg-Copenhagen; Newcastle-Luxembourg-Basle; and Newcastle-Paris. The Aerocharter tours are: Newcastle and or West Hartlepool to Paris, and Newcastle and or West Hartlepool to Basle.

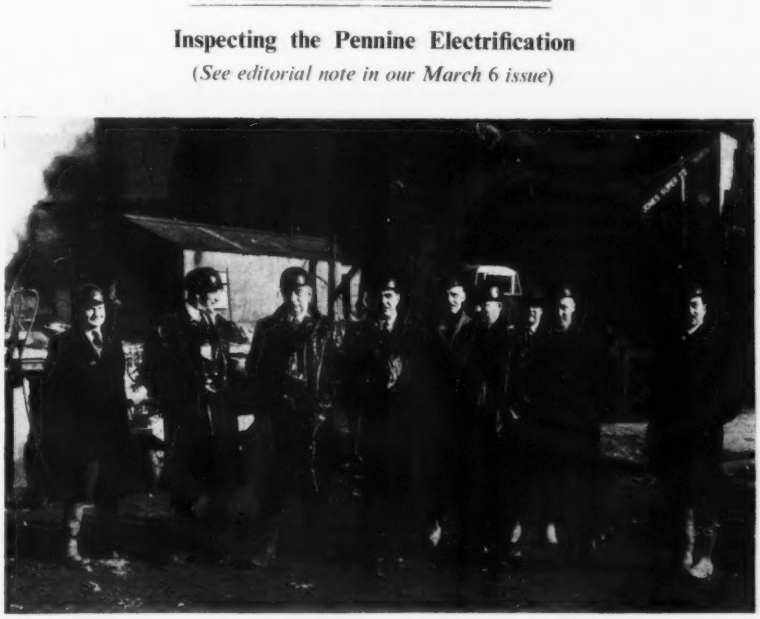
Emu Bay Railway Dividend.—Interest for the first six months of the year ended December 31 last, that is, 2½ per cent, *plus* 4½ per cent on account of arrears, will be paid on April 1 to holders of Emu Bay Railway 4½ per cent irredeemable debenture stock.

Clyde Coast Sailings.—British Railways, Scottish Region, announce alterations in the winter Clyde Coast steamer sailings, including withdrawal Mondays to Fridays of the 1·10 p.m. sailing from Craigendoran to Kilcreggan and Gourock, which however will continue on Saturdays. An advance programme of pleasure sailings, excursions, and tours on the Firth of Clyde and Loch Lomond next summer is being distributed to development associations, and so on, in the Clyde Coast area. This programme, which has a panoramic map of the area in colour, gives prospective visitors particulars of the many attractive cruises.

Electrical Engineers' Exhibition. — On Stand No. 52, at the Electrical Engineers' Exhibition (Earls Court, March 25-28), British Insulated Callender's Cables Limited is showing a wide range of electric cables and accessories, including mass-impregnated non-draining cables with aluminium sheaths, and aluminium claw type cable cleats; V.R.I. aluminium sheathed cables and terminating glands; detachable fused tee-boxes; power capacitors for P.F. correction; H.B.C. fuses; industrial wiring system; resilient moulded connector units; heat-resisting cables embodying silicone rubber-insulated cables

Inspecting the Pennine Electrification

(*See editorial note in our March 6 issue*)



Outside the new Woodhead Tunnel. Second from left, Mr. J. C. L. Train, and (left to right) Messrs. J. W. Watkins, C. K. Bird, J. I. Campbell, and (fourth from right) John Elliot

and flexibles, rubber-insulated and asbestos-braided flexibles, and Bestos A.C.C.A. and A.C.C. flexibles; copper busbars; and copper sections.

Dangerous Stop Block.—A checker was working, using some boxes as a desk, with his back to the end of a dock line terminated by a large concrete stop block bolted to the floor in a shed at Liverpool. He was suddenly struck in the back by the buffers of a truck which overlapped the stop by 3-4 ft. Awarding him damages for injuries and costs in an action against the Mersey Docks & Harbour Board, the Judge said he thought the arrangement of the block a trap for any workman. Immediately after the accident, he added, marks were painted on the floor behind the block indicating the danger area. If this had been done before the accident attention would have been drawn to the danger.

Charles Roberts & Co. Ltd.—At a meeting of the Board of Directors of Charles Roberts & Co. Ltd., held on February 3, the following resolution was unanimously passed: That in accordance with the provisions of Article 118 of the company's Articles of Association the Directors being satisfied that the assets of the company exclusive of the sum proposed to be distributed were of a value at least equal to the aggregate amount of the company's debts and liabilities and its paid up share capital) the sum of £600,000 representing part of the realised accretion to the capital assets of the company arising on the liquidation of Glyncorrwg Wagons Limited be divided by way of special capital bonus amongst the ordinary stockholders and that subject to this recommendation being approved by the ordinary stockholders at an extraordinary general meeting to be convened for that purpose, the special capital bonus be paid on or before March 31, 1953.

Forthcoming Meetings

March 23 (*Mon.*).—Institute of Transport (Scottish Section), at the North British Hotel, Edinburgh, at 6 p.m. Papers by Graduates and Students.

March 24 (*Tue.*).—Institute of Transport, Newcastle-upon-Tyne Graduate and Student Society, at the Railway Literary Institute, at 7 p.m. Annual General Meeting.

March 24 (*Tue.*)—Institution of Locomotive Engineers, visit to works of Pressed Steel Co. Ltd., Cowley, Oxford.

March 25 (*Wed.*).—Institute of Traffic Administration, Preston Centre, at the Bull & Royal Hotel, at 7.30 p.m. Annual General Meeting.

March 25 (*Wed.*).—Institute of Transport, Beds, Cambs, and Hunts Section, at Sussex House, Hobson Street, Cambridge, at 6 p.m. Annual General Meeting, and papers on "Telecommunication in P.S.V. Transport," by Mr. D. H. Briggs, and "Railway Cartage Services," by Mr. W. J. Hall (students).

March 25 (*Wed.*).—Institute of Transport, at 80, Portland Place, London, W.1, at 6 p.m. Meeting of the Visual Aids Study Group.

March 26 (*Thu.*).—Institute of Transport, Essex Group, at the Shire Hall, Chelmsford, at 7 p.m. Paper on "Railway Goods Traffic," by Mr. A. Wardle.

March 26 (*Thu.*).—Institution of Civil Engineers, at Great George Street, Westminster, S.W.1, at 5.30 p.m. Paper on "The Trend of Development in the Design and Equipment of Underground Railways," by Messrs. D. H. Coombe and G. J. Willson.

March 27 (*Fri.*).—Institute of Transport, Glasgow Discussion Group, at the Offices of the Railway Executive, 302, Buchanan Street, Glasgow, at 5.30 p.m. Discussion.

March 27 (*Fri.*).—Institute of Transport, Tees-side Section, at 7 p.m. at the Zetland Hotel, Saltburn, at 7 p.m. Annual Dinner and Visit of the President.

March 27 (*Fri.*).—Institute of Transport, Western Section, at the Docks Office, Bristol, at 1.15 p.m. Paper on "Some Aspects of Transport Insurance," by Mr. N. N. Head.

March 27 (*Fri.*).—Institution of Mechanical Engineers, at Storey's Gate, St. James's Park, London, S.W.1, at 5.30 p.m. Annual General Meeting, corporate and non-corporate members only.

April 1 (*Wed.*).—Institute of Traffic Administration, Southampton Centre, at the Chamber of Commerce, Southampton, at 7.30 p.m. Annual General Meeting.

April 1 (*Wed.*).—Institute of Traffic Administration, London Centre, at the Kingsley Hotel, Bloomsbury Way, London, W.C.1, at 7 p.m. Annual General Meeting.

April 7 (*Tue.*).—Institute of Traffic Administration, Portsmouth Centre, at the Chamber of Commerce, Portsmouth, at 7.15 p.m. Annual General Meeting.

April 8 (*Wed.*).—Institution of Railway Signal Engineers, at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.1, at 6 p.m. Annual General Meeting.

Railway Stock Market

International affairs have quietened stock markets and leading industrial shares lost a small part of recent gains though no heavy selling was in evidence. Buyers were rather more cautious, but British Funds have been steady because sentiment continued to be helped by hopes that the Budget may bring some reduction in taxation. Hopes in the City are centred on the possibility of a small cut in the standard rate of income tax, though there is still talk of some tax concessions in respect of profits earned in export markets, and revision of E.P.L. is also considered a possibility. The prevailing view is that markets are likely to become more active and develop renewed strength before the Budget, granted there are no fresh unsettling developments in international affairs.

Foreign rails have been more active, with White Pass & Yukon no par value shares again outstanding, dealings having been recorded up to close on $40, on suggestions that news may be forthcoming of an offer for the shares from U.S.A. interests. Whether these reports are borne out remains to be seen. Some suggestions are that the offer will not go to all shareholders, but only for blocks of shares held in Canada, which would give the purchaser control. Nevertheless there is no doubt that there has been strong and sustained buying in London in recent weeks.

At the time of going to press a little profit-taking has prevented best levels from being held, but the current level of $38½ compares with $30 a week ago, and during the same period the 5 per cent debentures have advanced from £106 to £131 because of their right of conversion into ordinary shares. Canadian Pacifics have been steady at $55¼, with the preference stock £64½ and the 4 per cent. debentures 80½.

The recent strong advance in Manila Rails has been followed by a reaction, awaiting more definite news from Manila of the position in regard to the operating company and plans for dealing with the bonds of the latter which are the only asset of the Manila Railway Company. At the time of writing, Manila Railway "A" debentures at 89 have lost part of earlier gains, as have the "B" debentures at 78, while the preference shares eased to 9s. and the ordinary shares to 4s. 6d.

The recent steady decline in United of Havana stocks attracted buyers, the "A" and "B" rallying to 60 and 58 respectively, while the second income stock was better at 21½ and the consolidated stock 3. There has been no revival of talk of an early takeover offer for the railway, but it is realised that the directors have indicated they would only consider a fair and reasonable offer, and the market view is that this would mean that if an offer is accepted, the various stocks would be worth more than current levels.

Antofagasta ordinary stock has been steady at 9½ with the preference at 50. Mexican Central "A" debentures firmed up to 69, San Paulo ordinary units were 6s. 3d., and Nitrate Rails shares 20s. 9d.

Brazil Railway bonds marked close on 7⅛, Chilian Northern 5 per cent debentures 25¼, while Guayaquil & Quito 5 per cent bonds have been active up to 37.

Road transport shares displayed firmness, helped by the good impression created by financial results issued recently. Lancashire Transport were 44s., West Riding 34s. 9d., and Southdown 30s. 6d. B.E.T. deferred stock has been steady at £490.

Engineering shares were steady, helped by the coming de-rationing of steel, though the effect of this on sentiment was offset to some extent by the higher price of steel. Vickers (48s. 6d.) and Cammell Laird 5s. shares (13s. 9d.) remained active, awaiting the financial results and dividend announcements. John Brown have attracted around 46s. in the hope of a higher dividend. Lord Aberconway has indicated that John Brown may not reacquire their former steel interests, but, on the other hand, a final decision must of course await the terms offered. Guest Keen have eased to 53s. 7½d. at the time of going to press. The market view is that if Guest Keen decide to buy back their former steel interests, it would probably mean that more capital would have to be raised. Babcock & Wilcox have changed hands quite actively around 71s. 3d. T. W. Ward strengthened to 77s., Ransome & Marles were 25s. 6d., and Tube Investments 61s. 10½d.

Beyer Peacock at 35s. 10½d. held firm on higher dividend hopes. Hurst Nelson were 42s. 6d. and North British Locomotive 15s. 9d., but Vulcan Foundry eased to 24s. Gloucester Wagon 10s. shares were 12s., Charles Roberts 5s. shares 19s. 7½d., and Wagon Repairs 5s. shares 12s. 3d. Central Wagon changed hands actively up to 66s. 3d.